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VOL. X.

SACRED PHILOSOPHY OF THE SEASONS;

BY THE REV. HENRY DUNCAN, D.D.

ADAPTED TO AMERICAN READERS,

BY F. W. P. GREENWOOD.

IN FOUR VOLUMES.

VOL. IV.—AUTUMN.

BOSTON:
MARSH, CAPEN, LYON, AND WEBB.
1839.

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SACRED

PHILOSOPHY OF THE SEASONS;

ILLUSTRATING THE PERFECTIONS OF GOD

IN THE PHENOMENA OF THE YEAR.

BY THE REV. HENRY DUNCAN, D.D.,
RUTHWELL, SCOTLAND.

WITH IMPORTANT ADDITIONS AND SOME MODIFICATIONS TO ADAPT IT TO

AMERICAN READERS,

BY REV. F. W. P. GREENWOOD, D.D.

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EDUCATION PRESS.

AUTUMN.

"Let us now fear the Lord our God, that giveth rain, both the former and the latter, in his season: He reserveth unto us the appointed weeks of the harvest."—*Jeremiah.*

"O'ER ALL HIS BOUNDLESS REALMS BENEATH THE SKY,
FROM PARCHED ANGOLA TO THE CHEERLESS POLES,
THE PARTIAL SUN NOW WIELDS AN EQUAL SWAY,
AND SHARES AN EQUAL EMPIRE WITH THE NIGHT.
LO! O'ER THE BURNING LINE, SUBLIME HE BENDS
HIS RADIANT COURSE TO SOUTHERN CLIMES REMOTE,
AND LEAVES US SHIVERING IN THE WINTRY BLAST;
WHILE TO THEIR SMILING REGIONS HE CONVEYS
LIFE, LIGHT, AND JOY ECSTATIC, WHICH PROCEED
FROM ALL THE GLORIES OF THE OPENING SPRING.—
UNEQUAL LOT OF MAN! AND MUST IT BE,
THAT HUMAN JOYS FROM HUMAN SORROWS RISE!
MUST STERN VICISSITUDE HER COURSE PURSUE,—
THE POINTED THORN STILL BLENDING WITH THE ROSE!
YET THANKFUL LET US MEET THE LAW OF HEAVEN,
WHICH WILLS FOR ALL, WHAT IS, WHAT MUST BE, BEST."

Lundie on September.

"GO, ASK THY HEART, WHAT SPIRIT THUS ABIDES
IN EVERY REGION? THUS MINUTELY WORKS
IN DESERTS? AND THY HEART SHALL ANSWER,—
'IT IS GOD.'"

Knox's Songs of Israel.

AUTHOR'S ADVERTISEMENT.

THIS last Volume of the Series will be found, in some respects, to differ in its character from the preceding volumes, and to bear, in a large portion of its contents, a less direct reference to the season of the year. It seemed right that the concluding volume, besides containing various details of autumnal appearances, produce, &c., and of the diversified labors of harvest, should be mainly occupied with the *general results* of that remarkable system which pervades animated nature, and of which the phenomena of the revolving year constitute one of the most prominent features. The wisdom and goodness of this system consist, not in its independent perfection, but in its admirable adaptation to the circumstances and condition of man. The problem has been said to be, "matter being given, to construct a world;" but more truly the problem was, human nature being given, to construct a system, by which the bodily and mental powers should be developed and carried forward towards perfection, and mind should meanwhile be exhibited in all its various phases.

In the arrangements and operations of Providence, this problem has been solved. Man is subjected to wants in order to stimulate his dormant powers; and while Nature, yielding to his judicious labors, is made to supply these wants, new wants are created, and the stimulus to con-

tinued exertion is increased. Again Nature is propitious, and again new wants arise; and thus man is urged forward, from improvement to improvement, in an increasing ratio, and an interminable series.

The chief wants of man, which Providence has employed as agents in this very peculiar system, are those of food, clothing, and shelter; giving rise, in the progress of society, to the corresponding arts of agriculture, manufactures, and architecture, with the concomitant of commercial intercourse; and these, so far as they spring, either directly or indirectly, out of the differences of seasons or of climate, form legitimate materials for the concluding volume of the 'SACRED PHILOSOPHY OF THE SEASONS.'

It will not be thought improper, however, that such interesting subjects should be pursued somewhat further, than a strict adherence to the leading object of the work might seem to require. There is something exceedingly interesting in the details of that progress, by which society has arrived at its present state of improvement in the arts, and to the continuance of which there is no assignable limit. In prosecuting this inquiry, the Author has felt it to be his duty, as well as his delight, to keep always in view the overruling hand of an unseen but ever-operating Intelligence; and, in marking the extent of human attainments, he has never ceased to direct the mind to the Great First Cause, and thence to the means of our redemption, and the future destiny of our race.

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SACRED PHILOSOPHY

OF THE

SEASONS.

AUTUMN.

FIRST WEEK—MONDAY

GENERAL CHARACTER OF AUTUMN

On considering the autumnal quarter, as indicated by the calendar, we shall find it more various in its character than any of the other seasons of the year. It seems, indeed, if we only regard its temperature, to form a kind of softened epitome of all the rest, in an inverted order. First, we have, in August, the warmth, and gentleness, and brilliancy of Summer; in September, the "ethereal mildness," the elasticity, the variety of Spring; in October, many of the features of a mitigated Winter,—its gloom, its hoar-frosts, its chilling breath, its howling storms,—alternating, however, with days, and even weeks, of the calm repose peculiarly characteristic of the season. For, let it be observed, that, although, in a general view, the analogy we have noticed holds good, yet Autumn has a remarkable character of its own, which distinguishes it from all the other seasons. It has succeeded a period of intense heat, from which it has only begun to emerge. Soon after the middle of June, the sun arrives at his highest altitude in the heavens; but although, from this period, he begins to recede, the heat ceases not to accumulate till the middle or end of July, after which the

effects of the decreasing intensity of his rays, and of the lengthening nights, become slightly perceptible. At the commencement of Autumn, therefore, the earth and the atmosphere still remain heated, and, although the periodical rains, about this time, create a copious evaporation, which serves to diminish its fervor, it is still sufficiently powerful to prevent those extremes, which mark the whole of the Spring quarter, and sometimes even the commencement of Summer. The peculiar feature of autumnal weather, therefore, is that of tranquillity, though allowance must be made for numerous exceptions.

When we turn from the atmosphere to the surface of the earth, we find a still greater peculiarity. The vegetable tribes, speaking generally, have advanced through the various stages of production and maturity, and, at the commencement of the season, are approaching the verge of old age. The bountiful earth, however, is still full of beauty, and vegetation appears yet to be in its vigor. The hay has been cut, and gathered into the barn-yard, and the young clover has again covered the mown fields with the liveliest green, or adorned them with its various-tinted flowers of red, white, and yellow. The crops of corn are beginning to beam with gold, about to invite the joyous labors of the reaper bands. The pastures still teem with a profusion of succulent herbage, on which the flocks and herds luxuriate, without anticipating the coming rigors of Winter,—happy at once in the protection of man, and in their ignorance of the future.

The woods, which have long exchanged the soft green of Spring for the more sober shades that indicate maturity, still retain all their leafy pride, and hide in their shady bosom myriads of the feathered tribes, which have not yet left our shores, to seek for that subsistence in warmer climes, about to be denied them in the land of their birth. They have, however, in general, ceased to sing; and the redbreast, and the mellow-toned wood-lark, thrush, and blackbird, which, after a period of silence, resume their notes early in this season, continue almost alone to render the groves vocal with their sweet music.

Another peculiarity of Autumn is a diminution both in the varieties and the profusion of its flowers. The blossoms of June had long run to seed, under the excessive heat of July, and had been succeeded by other flowers, chiefly of aromatic, thick-leaved, and succulent plants, and of those called compound-flowered ; but now, even these are in general casting their petals, and taking the form of seed. The meadow-saffron and Canterbury-bells, however, still ornament the English lawns, and the beautiful purple blossoms of the heath shed a rich glow over the uncultivated commons and craggy hills, covered with sheep.

[In New England, the various species of Aster, of Golden Rod, (*Solidago*,) of Gerardia, of Eupatorium, the wild Sunflower, (*Helianthus divaricatus*,) the Conyza, and the Life Everlasting, (*Gnaphalium*,) are in their glory in this month and the next, and are among the most showy of our wild plants.] This is peculiarly the season of ripeness. It is true, that, during the whole summer, herbs and fruits of various kinds have in succession been coming to maturity, and have thus diffused labor and enjoyment over a wider space. Several productions of the garden have already been gathered ; among which, the strawberry, the gooseberry, and the cherry have yielded their grateful fruits, to add to the pleasures of the summer months. But the vegetable productions capable of being stored for use, have been chiefly reserved for the autumnal season. It was not requisite, and would, in various respects, have been attended with disadvantage, both to man and the lower animals, for Nature to give forth her superabundant productions before that period when it should be necessary to lay them up for future supply. According to that admirable forethought, which the inquiring mind never ceases to perceive in the arrangements of the Creator, we find the ripening of corn and of various fruits immediately preceding the sterility of winter, not only that seeds fit for the sustenance of the wild tribes of granivorous animals might thus be more profusely scattered over the surface of the earth, but also that man might hoard in his storehouses whatever is necessary dur-

ing the unproductive season, for his own subsistence and that of the animals he domesticates for his use.

It was formerly observed, that labor is most beneficently diffused over the year, so as not to cause too great a pressure of agricultural employment in any one season ;* and this remark, which is true of the whole year, is equally true of Autumn. Harvest, indeed, is the farmer's busiest season ; but he is seldom overwhelmed with his labors, which follow in succession ; and many hands which, at other times, are engaged in different kinds of employment, are now found unoccupied, and ready to aid in the useful task. The season of reaping oats succeeds that of reaping barley ; and this again is followed by the wheat harvest, while the time for gathering peas and beans, potatoes and turnips, is still later, and seldom interferes with the former important operations. Thus it happens, that, while the farmer is enabled to store his produce in safety, the peasant obtains a desirable share of the toil and emolument arising from the operations of the season.

As the season advances, its character changes. At first it is full of enjoyment ; an exhilarating softness is in the air ; serenity and beauty is in the bright blue sky ; the fields, checkered with gold and lively green, speak of plenty and enjoyment ; every living thing is glad. The flocks grazing on the hills, the cattle ruminating in the shaded woodlands ; the birds silently flitting from bough to bough, or sporting in flocks through the perfectly transparent air, while they prepare their young for the long migrations which instinct teaches them now to meditate ; and not less the bands of reapers plying their task in the harvest field,—and the spectators, who, emancipated from the din and smoke, and artificial employments of the city, come to breathe health and refreshment in the country ;—all partake of the general joy of Nature in its most joyous season.

Towards the close of Autumn, however, a deeper sentiment occupies the mind. The warmth and brightness

* 'Spring,' Art. The Labors of the Husbandman wisely Distributed over the Year.

have gradually diminished; night has stolen slowly, but sensibly, on the day; the bustle and cheerfulness which pervaded the fields have ceased; the yellow grain, which betokened plenty, has been reaped and housed; and the ground, which lately shone in gold, lies withered and bare; the pastures have assumed a darker hue; the woods, although their varied and harmonizing tints are inexpressibly beautiful, speak of decay; and the sober stillness of an autumnal sky sheds a gentle sadness over the scene. It is impossible for a mind of sensibility to resist the spirit of melancholy which rests on the land and on the waters, which broods over the forests, which sighs in the air, which sits in silence on the motionless curtain of the gray clouds. Yet it is a melancholy not unmixed with enjoyment, and nearly allied to deep moral and religious feeling. The decay of Nature reminds us of our own. We too must pass into "the sere and yellow leaf," and fall away. The beauty of the woods, even in their fading, the sober grandeur of the earth and sky, the mild serenity which breathes around, on the mountain, the valley, and the placid lake,—all speak of the solemn but cheerful hour, in which the dying Christian falls asleep in the arms of his Saviour,—all seem to shadow forth the new heavens and new earth, wherein dwelleth righteousness,—all fill the soul with sublime musing on Him, the touch of whose finger changes every thing—Himself unchanged!

FIRST WEEK—TUESDAY.

AUTUMN IN THE CITY.

How often have our hearts swelled with pride on the view of those tokens of commercial wealth and industry, which, in union with liberty, form the distinguishing characteristics of our country. Harbors crowded with vessels, that import the produce of distant lands, or distribute on remote shores what we have manufactured; rivers, canals,

and railways, groaning under the merchandise of many a city ; highways thundering under the hurrying wheels of vehicles of all descriptions ; and people of all sorts thronging along, each in eager pursuit of some object, and each bearing on his countenance the expression of business and lively interest ;—such is the view which meets us on approaching any of our maritime towns, and it is complicated a hundred-fold when we draw near to a large city. If we enter the huge aggregate of buildings, and consider the public offices, the churches, the monuments, the magazines, these, too, lead the heart to exultation, and we say, what a wonderful creature is man ! How indefatigable, how ingenious, how aspiring, how powerful ! Walk we the thronged pavements, where our way is threaded through countless masses of human beings, under the influence of all varieties of passion, sordid or generous, vengeful or merciful, how little do we meet with to offend the eye or even the taste of the fastidious. How orderly, how cleanly, how sober ; for even in this great wilderness of earthly appetites and passions, order is the rule, the infringement of it the exception. That which shocks and disgusts is met with but rarely, while that which pleases or aids our purposes is frequent and at hand. Or, if we venture to tread the silent midnight streets, still parched or slippery from the thousand footsteps of the previous day, how quiet the repose of the busy souls, who sleep, or seem to sleep. The noise of day, the crash of wheels, the din of men, and bells, and hammers, and machinery, is hushed ; and the muffled watchman, eyeing askance the straggler, or urging forward the suspected footstep, is all that meets us to tell of life. But for him, and a few scattered lights in upper casements, we might imagine ourselves perambulating a city of the plague,—a doomed spot,—a forsaken region, to which the rising sun will no more restore life and action, than he will to the mouldering towers of Memphis or of Thebes.

Blessed sleep ! thou mercifully designed composer of human irritations, winder up of worldly cares, and soother of drooping infirmities ! How well did He who knoweth our frame, and remembereth that we are

dust, consider our necessities, when He bestowed thy periodical return of rest, and dropped the curtain of the night not only on the lonely and tranquil hamlets, but on the great Babels of the world, which send their roar through all their gates by day.

The town is wonderful. It is the invention and the handiwork of the gregarious creature, Man.* We admire while we consider it ;—but if our admiration be analyzed, it will be found to partake of a mixture of opposite things. That so much licentiousness should exist, and produce so little that is outwardly disgusting ; that so many selfish and grasping creatures should so little betray their rapacity ; that so many vindictive and angry beings should so well conceal their hatred or wrath ;—all these subjects are as wonderful, as that such a mass of humanity should be accommodated in so little space, and such an accumulation of bodily necessities find, within the same, meat, drink, and clothing.

The heart is weighed down by the consideration, that a crowd of dying and responsible men is but an aggregation of evil. Were the fair covering withdrawn, what would be the spectacle behind it ! Pass through the airless alleys of a city in autumn, look on the languid and pallid faces of its inhabitants ; see the poor children, unconscious of the elasticity of their age, and with cheeks on which grime has occupied the place where roses never bloomed ; inhale the dull, oily atmosphere which hangs over them for ever ; and sicken at the inevitable odors which assault your senses ;—then let your imagination convey you to the airy brow of a balmy hill, whence you can survey the valleys covered with corn, inhale the fragrance of the bean and clover fields, and behold the lusty rustics glowing over the sickle ; see them breasting the waves of toil, and with light hearts encountering every labor,—and you will look back with compassion, tenfold more intense, on those whose lot is cast where man is plentiful as the ears of corn, and where moral and physical evil aggravate each other. Even the balconies of the

* "God made the country, but man made the town."-COWPER.

opulent, with their dusty beau-pots, cause a breathless longing for green fields ; and the splendid array of highly cultivated flowers, fruits, and vegetables, compressed into such a space as a city market, tell of that wealth which can command all that is luxurious, rather than of the simple garden and the glade studded with trees.

Did you ever, at the upper windows of some poor dwelling in a narrow court, observe a broken tea-pot, with its sprig of peppermint or southern-wood, sustained by a rude rail, ambitiously painted green ? You may be sure some poor soul dwells there, who is transplanted by hard necessity into the cheerless privations of that home, from some fresh cottage where the spring bubbled up in crystal beauty in the well, where the grass, sown with daisies and buttercups, approached even to the door-step, and the free breeze of heaven blew all around him :—

> " The stranger, hurrying through the dingy town,
> May know his workshop by its sweet wild flowers.
> Cropp'd on the Sabbath from the hedge-side bowers,
> The hawthorn blossom from his window droops ;
> Far from the headlong stream and lucid air
> The pallid Alpine rose to meet him stoops,
> As if to soothe a brother in despair,
> Exiled from Nature and her pictures fair."*

And well will it be, if the denizen of the city lose not the regret for that country home ; well will it be, if, even at the expense of some sentimental sorrow, the intervals of toil be filled up by remembrances of country habits and youthful happiness ; well will it be, if the soul-destroying dram-shops do not obliterate the remembrance of the tranquil cottage, and if the sight of a poor, drooping, smoky, city sparrow, draw a tear at the remembrance of the sweet songsters that peopled the trees of the fields where his childhood roamed at large. Such regrets and remembrances do not necessarily indicate discontent with our present lot, but rather keep alive in the heart the healthier associations which protect from deterioration, and save from complete amalgamation with the evil which surrounds us. Their influence is calculated to be even of

* Ebenezer Elliot.

higher and nobler utility, if it lead him to cast the eye of faith far into that promised land where the sun will not light on the inhabitants, nor any heat; where hunger, thirst, toil, and tears are unknown, where unavailing regrets and bootless longings can no more enter, than stings of conscience or apprehensions of future sorrow. How merciful is that arrangement which secludes every mind from all the minds around it, and leaves it unveiled before its God alone. The soul can rise superior to that contaminating mass of human beings, which limits bodily movement, taints the air, and injures health; for, in its spiritual mechanism, it is capable of a secret and ennobling intercourse, unintruded on by the thronging and bustling crowd around it.

Obadiah was able to "fear the Lord greatly," while his eyes and ears were exposed to the offensive and polluted worship of Baal; and his sovereign, Ahab, in whose hand his life was, could not, with all his tyranny and malignity, either penetrate or prevent the communion which his spirit held with his God. So may the soul, that has tasted how suitable to holy contemplation are the calm retreat and silent shade, be able to sustain that contemplation, when the remembrance of the retreat and shade are all that is left him. "The mind is its own place," and those who in any situation endeavor to draw nigh unto God, will find his promise sure, that He will draw nigh unto them. The very restlessness of human wishes, the fruitless toil, the failure of enjoyment even when the desired object is possessed, which are constantly exhibited in the crowded city, are as well calculated to tutor the contemplative mind, as the lonely wilderness or the mouldering ruin. All that man labors after, and all the mistaken estimates that he forms of himself, may be seen rather in the city than the country. It is not, therefore, a place of tranquil enjoyment, but surely it is a place of warning.

> "Earth walketh on the earth, glittering like gold
> Earth goeth to the earth sooner than it would;
> Earth buildeth on the earth temples and towers,
> Earth sayeth to the earth, all shall be ours."

So says the mouldering grave-stone by the gray ruins of

Melrose Abbey. The same great lesson is as surely and far more painfully impressed on the contemplative soul, in the din of a great community. M. G. L. D.

FIRST WEEK—WEDNESDAY.

FAMINE IN THE BEGINNING OF AUTUMN.

THE indication of spring in the change of atmosphere, so marked sometimes for a week or two in the early part of that season, that it is called by the French *L'eté de San Martin*, (Saint Martin's summer,) attunes the feelings to hope, with respect to what is in the womb of time, and soon to be enjoyed more uninterruptedly. And again, the balmy breath of summer, maturing vegetables, and covering the valleys with the green blade that affords the promise of a fruitful harvest, cheers and enlivens those who are at ease in their possessions. Being out of reach of want themselves, they little wot of the extremities of hunger and privation, of discontent, of envy, and of longing desire, which are endured and called into exercise amongst their fellow beings, who are a few grades below them in the scale of providential bounty. Then the humane and benevolent, whose sympathies for the poor are much awakened by cold, (an evil which they partially share with them,) feel as if at liberty to relax from their care and exertion, and conclude that the season of heavy privation is over. How little do they know the truth, in the case of a year of scarcity! It is not till the sun rises high above the horizon, and his influence warms the bosom of the earth, that the truly pinching time of famine arrives. The scanty crop has been husbanded during winter; its gleanings still eke out a meal in the early part of summer; but then all is expended, and famine, that scourge of the Lord, meets the poor with inevitable sternness.

> "O, who can warm himself in winter's frost
> By thinking of meridian summer's heat?"

Or who can satisfy the present cravings of hunger, by gazing on crops not yet ripened for the sickle? Any one who has penetrated the lanes, the cellars, and the garrets of the crowded city, and breathed the tainted air, which, in dun vapors, hangs around them, must shudder at the helplessness of man, and the extent of his capacity of suffering. Strong exertion, and fixed purpose to lend aid, only alleviate bodily wants in a degree, while they too often draw forth most painful exhibitions of moral evil. Selfishness, envy, deceit, and trickery, are vices which are stirred into more lively action by a dispensation of rebuke and judgement. The heart of the philanthropist has often been chilled, and his extended hand checked, by the sight of the human character, as it is displayed when struggling under the afflictions of want, without being subdued by them. Yet these are the fruits which God, who penetrates the heart, knows to be in the germ all the while that his rain and sunshine have been shed on it. Has He been patient so long? let not man fret because of a fellow sinner. When He smites, let the soul of the reconciled go out in pity and in prayer.

But, regard it as we may, famine is one of the sorest evils, coming direct from the Divine Hand, that falls upon man. It is of not uncommon occurrence, and against it industry and contrivance have little power. Not only does the uncivilized Caffre pine under its influence, and draw his famine-belt tighter, as the pinching foe gripes him more closely, but the industrious and ingenious European bows under its dominion, and, hunger-bitten, sinks and dies.

We look to second causes, and impute our years of dearth to wet and cold, to hot and parching seasons, to cycles of weather, to comets, and many other accidents, some of them real and others imaginary, and thus wilfully conceal from our view the power of God, who blesseth a land, and maketh it to bring forth fruit abundantly, and, again, who "turneth a fruitful land into barrenness for the wickedness of them who dwell therein." He has said, "that nation will I punish with famine;" and "I will send the famine among them." To his people Israel, He

made this denunciation, "If ye will not yet for all this hearken unto me, then I will punish you seven times more for your sins. I will break the pride of your power, and I will make your heaven as iron, and your earth as brass." Again, "the Lord shall smite thee with blasting and mildew; and the heaven that is over thy head shall be brass, and the earth that is under thee shall be iron." According to the Mosaic law, after six years of culture, the seventh was to be a Sabbath of rest unto the land, and a sabbath to the Lord. When, through want of faith in the Divine care, which was to furnish them meat in the sabbatical year, the Israelites left off the observance of this law, they did not expect that God would reckon with them for their disobedience. Yet, nearly a thousand years after the law was promulgated, where an account is given of burning the houses of gold and the palaces, and of carrying away captive to Babylon those who had escaped the sword, we are reminded that a strict account had been preserved of every act of disobedience. The sabbatical years were still to be required of them, and to be forcibly exacted, for they were to be kept in captivity "till the land had enjoyed her sabbaths: for, as long as she lay desolate, she kept sabbath, to fulfil threescore and ten years."*

Another remarkable instance of retribution, appears in the failure to release the bondmen in the year of jubilee. The law was, that if a brother were waxen poor, he might pay his debt by means of his labor, and that of his family; but this could not extend beyond the year of release, when he was to depart, both he and his children, and return to the possession of his fathers. They were not to be sold as bondmen, or ruled over with rigor; for they were God's servants, which He brought forth out of the land of Egypt. The cupidity or unfaithfulness of the wealthy in Judea, had led them to disobey this law. But when the time of retribution arrived, while the king saw his sons and the nobles slain before his eyes, and was himself carried captive, with all the people possessing wealth and substance, "Nebuzar-adan, the captain of the

* 2 Chron. xxxvi. 21.

guard, left of the *poor of the people, which had nothing* in the land of Judah, and gave them vineyards and fields at the same time."* So that they were "returned to the possession of their fathers," while those who had wronged them, entered on a more severe foreign bondage.

We surely greatly err, if we content ourselves with saying, we are not now under the Jewish dispensation; we are not under a discipline of temporal rewards and punishments; and thus neglect the acts of God's providence, which are as certainly a part of his administration now, as in former ages, and as directly affect each individual of the whole race of Adam, as they did the children of Abraham. Those shall know who follow on to know the Lord. It is to those who are subdued under his rebukes that He sendeth *his word*, to heal them. They who watch the ruling hand of God, shall become wiser in reading his purposes, and their own necessities. If a man abuse his corporeal frame by excesses, he is visited with bodily distempers, at the present day, whether he be Jew or Gentile. If he waste his days in sloth, his substance will become wasted also. If he refuse to cultivate his mental powers, ignorance and stupidity must be the consequence. If he drink to excess, he will be deprived for a time of reason. Need he wonder, then, if he should misapply the wholesome grain which is good for food, by extracting from it a spirit that consumes his senses and his strength, that God should, for a time, prevent the grain from growing, and leave him to feel that the sun and the shower are withheld in wrath. When he is lifted up, as if by his own wisdom and power he had gotten all this great wealth, doth not God regard it, and will He not remind him from whence his prosperity flowed? When, as a nation, we glory in our skill and ingenuity, and feel as if, through our various mechanical contrivances, nothing shall be withholden from us, do we not expose ourselves to a national rebuke, and ought we not, when we meet it, to humble ourselves under it?

It has been a subject of philosophical investigation,

* Jeremiah xxxix. 10.

whether famine and privation, as instruments, are calculated to subdue the will, to awaken the intellectual powers, and to enlarge the mind; and the conclusion generally arrived at is a negative one. When bodily necessities are clamant, the mind is absorbed in them. When the unsubdued will is in a state of suffering, it is only excited to further rebellion. If it cannot be proved, however, that famine has been frequently the instrument of turning the heart to God, very many of his reconciled children can tell how their straits and necessities have sent them to prayer, and how His hand, shown in their deliverances, has enabled them to glorify His name; and, at the same time, there are very many examples of intellectual might contending with poverty, and gathering knowledge in the face of much privation. When to this laudable spirit is added the love of God, and contentment with his dispensation, one of the noblest characters is formed, of which humanity, in this state of things, is capable. To this, the apostle had attained; but we must remark that, if, in whatsoever state he was, he had learned to be content; if he knew both how to be abased, and how to abound, how to be full and how to be hungry, how to abound and to suffer need, it was because he leaned not on himself, but on Christ which strengthened him; it was because his portion was not of this world, but of a better and enduring substance; it was because the object which commanded the strenuous efforts of his energetic mind, was not silver and gold, not corn and wine, but the gathering in of lost sheep to the fold, the guiding of them in the paths of peace, and teaching of them and himself, to glorify their Lord with and by what He bestowed, whether of a temporal or spiritual character, and whether granted in large measure or in small.

M. G. L. D.

FIRST WEEK—THURSDAY.

AUTUMNAL VEGETATION.

I HAVE elsewhere observed, that there is a vegetable cycle corresponding to the annual cycle, and obviously adapted to it with consummate wisdom. This is at no season more conspicuous than in the autumn of temperate climates. The sun is gradually withdrawing his prolific powers, and the general character of the season is about to become less genial. But before the period of cold and storms actually arrives, it is anticipated by the preparations of the vegetable creation. During spring and summer, the various classes of plants and flowers have been running through their respective changes in conformity to the season, and have now reached their last period of annual developement. The vegetative powers of the different races are very diversified; some are formed to rise from the germ, to shoot into flower, to form seed, to ripen, to throw their seed into the bosom of the fostering earth, and then to wither and die,—the individual, after having provided for the preservation of the species, being destined to perish the same year in which it has been produced; others, though destined to run a similar course, retain life in their roots, and the individuals themselves, as well as their seeds, spring up again in a new season, to pass once more, and, in many cases, frequently through the same annual round; others still, while they yearly put forth and shed their leaves, their flowers, their fruit, and their seed, retain their stem and branches under all the vicissitudes of the seasons, which, for years, and, in the case of trees, for ages and even centuries, flourish and grow, shooting their roots deep into the earth, in proportion as they raise their ample heads to the storm. But various as are their qualities and laws of existence, in all of them the annual cycle is rigidly observed, which, in every instance, is beautifully, and with most obvious intention, suited to the

weather and other circumstances in the different localities, and the respective seasons of the year.

In autumn, while the days are still glowing with brightness and warmth, and the thermometer has scarcely begun to indicate any decrease of temperature,—when the only perceptible change is some encroachment of the night on the day,—and when the weather, in all its properties, is not less genial than during the most favorable period of summer, a very remarkable alteration takes place in the physiological condition of plants, proving that this condition is regulated by a law which is independent of external circumstances, and yet bears a striking reference to them. The alteration to which I allude, is a diminution, and at length a total suspension, of the flow of sap from the roots, on which the vegetative process depends ; and the thing to be remarked is, that this relation is prospective. The period has not yet arrived, for which such a preparation is made, but is only approaching. One important and early consequence of this diminished action, is the ripening of the fruits and seed. It has been found, indeed, that, within certain bounds, whatever diminishes the vigor of vegetation, hastens the maturity of the fruit. Thus gardeners know that by stripping trees of their leaves, the period of ripening the fruit may be hastened ; and this effect is not produced so much by exposing the fruit to the influence of the sun, as by interrupting the flow of the sap. Hence it appears that the maturity of the fruit is a proof that the vital power has become less vigorous and is hastening to a state either of extinction, if the plant be annual, or of comparative repose, if it survive the winter. This is particularly obvious in the ripening of grain. The plant loses its verdant color, the straw becomes less succulent, the leaf shrivels, the seed becomes hard, every thing, in short, indicates that the sap has ceased to flow, that its vegetative power is exhausted, and, having fulfilled the object of its creation, that it has run its destined course.

Nothing, indeed, can be more indicative of a Designing Cause than the fact, that all plants, as soon as their annual growth and reproduction have been accomplished,

decay, either in whole or in part; and that, in the great majority of instances, these purposes are only consummated a short time previous to the period when the severity of coming winter would, had their cycle been protracted, have prematurely checked their progress, and rendered the labors of the year abortive.

Besides the ripening of seeds and fruits, another preparation for approaching winter, which takes place at a later period of the season, is the fall of the leaf. This also is a wise provision of the Creator, to fit the vegetable world for encountering the storms which, in the inclement season, they are destined to endure. Some plants and trees, indeed, do not cast their leaves at this season; but even these exceptions afford, as I have elsewhere shown, a new proof of Designing Intelligence, compensating conditions having been assigned to them. To account, on physiological principles, for this fall of the leaf, various theories have been formed. Some have ascribed it to defective transpiration, and consequent accumulation of juices in the vessels; others to an inequality of growth between the stem and petiole of the leaf during the progress of vegetation;* others, to the drying and hardening of the cellular tissue, supposed to take place at the insertion of the petiole into the stem; others, to a simple sloughing of worn-out parts; and others, still, to the growth of the new bud, and a consequent diversion of the sap. But, whatever may be the immediate causes, the effect itself is, assuredly, dependent on the constitution originally imparted to the plant, and is not the less a proof of Creative Wisdom. This is, in fact, only a single instance of a universal law, by which the parts of vegetables decay in every step of their progress, after having fulfilled their allotted functions. Thus, the tunics of the seed perish in the earth, after having nourished and protected the germ in its earliest developement. A similar fate awaits the cotyledons† which push them-

* [The *petiole* is the stalk which supports the leaf; the *stem* is the general supporter of leaves, flowers, and fruit.—Am. Ed.]

† [Cotyledons are the leaves or lobes of a seed, which open when the germ shoots forth. Most seeds have two lobes, and the plants to which they belong are called dicotyledonous. The palms are monocotyledonous, their seeds or nuts being whole, or having but one lobe.—Am. Ed.]

selves into the air, when they are no longer necessary for supplying the place of leaves. The petals of flowers, also, with their stamens and pistils, wither and fall when the formation of the seed has been effected; and when at last the fruit has arrived at maturity, it likewise separates from the parent plant or tree, and drops to the ground.

I have already remarked, that the duration of the stem and branches is very different in different plants. The longevity of some trees is very remarkable. The following notice is taken from the article 'Vegetable Physiology,' in the Supplement to the Encyclopædia Britannica. "The Gentleman's Magazine, for 1762, contains an account of the age of a chestnut-tree, then growing at Tamworth, in Staffordshire. This tree, it is said, was, at that period, probably the oldest, and certainly one of the largest, in England, being fifty-two feet in circumference. Its period of rising from the nut may be fixed at the year 800, in the reign of King Egbert. From that date to the reign of King Stephen is 335 years, at which time it was fixed on as a boundary or landmark, and called, by way of distinction, 'the Great Chestnut Tree of Tamworth.' From the first year of Stephen (anno 1135) to 1762, is 627 years, so that its entire age at that period was 962 years. It bore nuts in 1759, from which young trees were raised."

It is probable that some kinds of trees, which are natives of more genial climates, are even longer lived than the great tree of Tamworth. It is interesting to know, that there are olive trees of a most venerable age now growing in the garden of Gethsemane, near the bottom of the Mount of Olives, which are supposed to have sprung from the roots of those that existed there during our Saviour's life. The conjecture is founded on the known longevity of the olive. The historical fact, that, during the siege of Jerusalem, Titus cut down all the trees in the neighborhood of that devoted city, seems to preclude the possibility of their being the very trees whose boughs shaded the Divine Sufferer in his agony; but yet there is something which wonderfully excites the imagination, in the fact, that, after the lapse of more

than seventeen centuries, scions of those venerable olives should still be in existence to mark the sacred spot.*

FIRST WEEK—FRIDAY.

PROGRESS OF VEGETATION IN THE CORN-PLANTS.

HAVING now arrived at the season when the different kinds of corn have reached maturity, it may be proper to look back on the various steps by which the vegetative process has been completed. In this retrospect, we shall constantly be reminded of the Creative Intelligence and superintending care of the God of the Seasons.

I have, in the 'Spring' volume, taken some notice of the nature and productive qualities of cultivated grain, as well as of the history of the various species, as articles of agriculture. What I intend to do, at present, is to trace the seed in the progress of its developement, from the period in which it is thrown into the prepared soil, till that in which it becomes ripe for the sickle. Of all the kinds of corn raised in Europe, that of wheat is not only the most valuable, but the longest attached to the soil before it arrives at full perfection. I shall confine myself, therefore, to this species of the cereal plants, premising, that the physiological history of wheat is, with some slight exceptions, nearly identical with that of its kindred tribes.

Wheat is generally sown in the last weeks of autumn, so as to pass through the first important steps of the vegetative process before the severity of winter sets in. In its earliest growth there is little peculiar. Like other seeds, whose developement has been described in the volume on 'Spring,' it consists of a bud containing the embryo

* [Chateaubriand says some of these very trees can unquestionably be traced to the time of the Eastern empire. In Turkey, every olive-tree, found standing by the Mussulmans, when they conquered Asia, pays one medine to the treasury; every one planted since the conquest, is taxed half its produce. Now, eight of these trees, very large and old, are still charged only eight medines.—AM. ED.]

of the future root and plumale,* wrapt up in integuments, and lying between, but at one end of the cotyledons, which serve as its first nourishment. When the seed has been in the ground for about two days, it begins to swell, and the juices contained in the cotyledons, being communicated to the bud, produce in it the first vegetative motions, and cause it to shoot out its roots and plumale. The root is at first wrapt up in a kind of purse, through which it forces its way. Two other roots spring forth in a lateral direction, within a few days, and burst through the texture which covered them, now softened by the moisture of the earth in which they are buried. Each of the roots is shagged with a number of fibres, which closely twine about the particles of earth presented to them in their progress, and extract from them whatever is capable of nourishing the young plant in conjunction with the fluids which it still derives from the inward substance of the seed.

Meanwhile, the plumale shoots upwards in as direct a line as circumstances will admit, protected by a little tegument, which withers away when its services are no longer required. In favorable circumstances, the corn will begin, about the sixth or seventh day, to push its verdant point through the surface of the earth. This feeble stem is nothing more than a bundle of leaves folded over each other, and around the delicate embryo which is to form the future spike. The first leaf of this packet opens a little towards the point, but its lower part is always rolled up in the hard covering from whence it springs. In a few days after the stem emerges to the light, the parent seed, which has been gradually giving out its milky juices for the nourishment of the plant, shrivels up and begins to decay.

If we clear away the tegument of the seed, and retrench the matter from whence the roots have shot, along with the roots themselves, as well as that which emitted the plumale, we shall have nothing left but the bundle of green leaves already mentioned, which contains the real stem. These leaves, when carefully and skilfully un-

* [The plumale, or plumula, is the upper or leafy part of the embryo plant.—Am. Ed.]

folded, will display the first rudiments of four tubes growing out of each other, and attached by knots. These compose the stem, and, at the highest extremity of the upper tube, the bud of the spike will appear. From the first knot, which is nearest to the roots, a leaf springs forth, and performs the office of a covering to the second tube. Another leaf likewise rises from the second knot, and wraps itself round the third tube. The third knot produces another leaf, which encloses the fourth tube, together with the embryo spike. The space between the first and second knot, nearest the roots, is then much larger than the interval that separates the second knot from the third. The spike rising, as I have already said, at the upper extremity of the fourth tube, may, even at this period, be easily distinguished by the roundness and transparency of its little grains, which resemble so many pearls.

In this state, the plant braves all the severity of winter. The spike, secure in its fourfold integuments, and in that mysterious power of the vital principle, which, if it does not actually generate heat, at least resists the influence of cold, endures without injury the fury of the tempest, the pelting of the heavy rains, and those sudden alternations of temperature, to which the season is liable. The leaves, which so carefully embrace it, preserve their verdure, and, in every favorable interval of warmth, continue to flourish and expand. On the return of spring, should the vegetation appear to be prematurely luxuriant, the husbandman fearlessly admits to the field a flock of sheep, which, by nibbling off the points of the foliage, afford greater nourishment to the stem, and by giving the vegetative power a new direction, cause the wheat to *tiller*, that is, produce new shoots, and occasion a more abundant produce.

As the season becomes more genial, the stem shoots vigorously upwards, abandoning the leaves, which are no longer necessary for its covering: the spike itself enlarges, and casts aside its integuments. The different lodgements that are to contain the future grains, begin to be enlarged; and at length they unfold two kinds of pistils, to receive the powder from the knot of chives

which appear in a higher situation, and whose influence is necessary to impart fertility to the buds.

During this stage of the vegetation, a considerable change takes place in the plant. The foliage and the first leaves, which are no longer necessary for the protection of the seed, fall down, lose their juices, and wither away. The whole vital power seems now to be required for the nourishment of the stem, and through the stem, for that of the spike; which latter, indeed, is obviously the main design of the whole process. They are therefore concentrated in this important object.

There is another circumstance in the formation of the stem, which is too admirable to be passed over in silence. It is one of the conditions which Creative Wisdom has impressed upon this plant, that it shall rise to a considerable height, and thus furnish a useful straw to the husbandman; while, by this means, it receives the advantage of the free admittance of the air, and full exposure to the genial rays of the sun, instead of being overborne, as it might otherwise have been, by the cumbersome luxuriance of an inferior vegetation. This condition, however, required peculiar qualities in the stem. That it might occupy little space in the field, and thus admit of as much nourishing grain as possible in a given quantity of ground, it is of importance that the stalk should be slender; and, accordingly, it does not extend to more, on an average, than two-twelfths of an inch in diameter, while it rises to the height of four or five feet, and even sometimes more. How does it happen, that so long and thin a stalk should be able to support a spike heavy with grain? The contrivance by which this is secured, is not a little remarkable. In the first place, the stem is a hollow tube,—a form which can easily be demonstrated to be the most advantageous for strength and for resisting injury; and, in the next place, four knots of a solid substance, resembling firm bands, give it strength, without unduly diminishing its flexibility. So constituted, it is capable of bending without being broken under all common gales of wind, and even under the force of impetuous blasts; the knots enabling it to recover its upright position in the returning calm. It is beautiful to see the undulations of a field of

corn during a breeze, with its forest of spikes bending to and and fro, and rolling, "like the waves of an immense ocean."

An equally wise precaution has been employed in the formation of the spike itself, in which the grains are ranged one above another, at equal distances, that the nourishment may be duly distributed; while the tunics of these grains are so formed, in correspondence with their position, as to ward off the injurious effects of the rain, and to mitigate the intense heat of the sunbeams, as well as the cold of the night breeze; thus preserving a grateful and genial temperature.

During the whole period of growth, the nourishing juices have been amply supplied from the root, and, being duly secreted, have been distributed to the various parts of the plant, as they were required, and especially to the spike, which has now acquired its useful farina. It is at length, however, necessary that the grain should ripen; and, for this purpose, the same wonder-working Hand, which so formed the plant as to cause it to imbibe its nourishment from the soil, now arrests the flow of that nourishment. The vegetative power has accomplished its task, by forming and perfecting the seed. The ducts which furnished channels to the juices through the stalk, no longer perform their office; the fibres of the plant become rigid; the grain hardens; the stem and the spike at once assume a golden hue,—thus indicating that the vital principle which sustained them has departed. The grain is ripe, and nothing now remains but that man should secure the prize which a bountiful Providence has awarded him.*

FIRST WEEK—SATURDAY.

HARVEST.

All who have been educated in the country, cherish very pleasing recollections of the operations of harvest.

* Spectacle de la Nature.—Dialogue xii.

It may not, however, be very easy to define this pleasure. It is one of those emotions that are too subtile and too complicated to be readily analyzed. Every one feels and acknowledges it, yet, if we be asked whence it proceeds, we shall not, without a considerable effort of mind, find ourselves able to return an intelligent reply. It is easy to understand, indeed, why the serenity and brightness of the buoyant atmosphere, the beauty of the fields and woods, the richness of the golden crops, the bustle of business, should all serve to awaken in the mind an agreeable interest. There is something animating, too, in the reflection, that the employments of the harvest-field have been handed down from generation to generation, from time immemorial,—that they have, in fact, distinguished civilized man in temperate regions, during every age of the world; the same kinds of corn which now wave on our cultivated fields, having covered the valleys of Rome, of Greece, of Palestine, and of Egypt, in distant ages, and having been, in like manner, as in the present day, cut with the sickle, bound into sheaves, collected in shocks, and secured in barns. The many allusions, in Scripture, to these operations, give a kind of sacredness to the feelings connected with the season.

But the pleasure which fills every heart in the period of harvest, has a deeper and more recondite origin, and seems to be chiefly that of sympathy. In this respect it corresponds with the enjoyments of the hay-making season, alluded to in the 'Summer' volume. The labors of the agriculturist have been crowned with success. His fields teem with plenty. The golden crop yields its stores to replenish his granaries, and to be diffused over the land in food for man and beast. It is not the direct application of this consciousness to our own individual case,—it is not the selfish feeling that *we* are to be benefited by this profusion, which gives rise to the purest ingredient in this enjoyment. The sentiment is of a more exalted, because of a benevolent nature. We regard the blessing as a common gift of a bountiful Providence; and it is in sympathy with our fellows, more than in an exclusive sense of our own advantage, that the pleasura-

ble emotion consists. The heart thus opened, is prepared for that social enjoyment, which we observed so remarkably diffused over whole bands of reapers, engaged in the same toilsome but healthful employment. The emotion spreads from heart to heart, and the animation which prevails, while the work proceeds, is not less an indication of gladness than the joke and song with which the welkin resounds, during the intervals of rest. Who can view the joy which sparkles in the eye, and bursts from the lips of the reaper, while he plies his daily task, and not acknowledge a beneficent Creator ?

There is another kind of harvest, confined, however, in its locality, but still more picturesque than that of corn, and not less exhilarating to those who are engaged in it; I mean the hop-gathering. It is thus described by one who seems to be familiar with its details. "We cannot boast of our vineyards ; but we question whether Italy itself can show a more beautiful or picturesque scene than an English hop-garden in picking-time. The hops, which have luxuriantly climbed to the very tops of their poles, hang on all sides their heavy heads of scaly flowers, in festoons and garlands, and the groups of pickers, seated in the open air beneath the clear lustre of an autumnal sky ; age in its contentment, and youth in its joy ; and the boys and girls who carry to them the poles, covered with all their nodding honors, may match, for objects of interest, the light forms and dark eyes of Italy. Kent, Sussex, and Worcestershire, are the counties most famous for the growth of hops. Considerable quantities, however, are cultivated in Nottinghamshire, and are known in commerce by the name of North Clay Hops."*

Were we to turn our eyes to other climates, it would be proper to notice the season of grape-gathering in the vine countries of Italy, France, and Spain, of which travellers and poets have spoken with so much interest ; and in tropical regions, the period of cutting the sugar-cane, and plucking the coffee ; while various other opera-

* Howitt's 'Book of the Seasons'—August.

tions would also fall to be described, such as the collecting of cotton from the plant on which it grows, and the securing of the rice and the millet; but this extension of the subject would lead us into details which must be omitted.

In the season of harvest, especially, we witness the triumphs of cultivation. Let us ascend the rising ground, and while we contemplate the animating scene, reflect on the human skill and labor which it displays. What a rich prospect is spread around us! how varied! how full of joy and hope! On one hand, the ripe grain falls under the hand of the reaper; on another, various shades of lighter and darker green mark the fields teeming with esculent roots. Yonder, again, the leguminous plants, which lately filled the air with their delicious odor, and delighted the eye with the gay profusion of their flowers, bend under the load of the stores wrapped up in their swollen capsules; and, in the sloping lawn where we stand, a verdant carpet is spread, still sprinkled here and there with a few lingering wild flowers, where the animals, destined for the use of man, find at once abundant food and soft repose. What a variety of overpowering, but most pleasing views, crowd upon the mind in the contemplation; views which all centre in a deep conviction that a Father's hand is here!

SECOND WEEK—SUNDAY.

THE STABILITY OF NATURE.

"While the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night, shall not cease." Such was the promise made by the Creator to the awe-struck remnant who escaped from the destruction of the Deluge. It was a promise at once beneficent and seasonable. They had just witnessed a terrible and destructive deviation from that uni-

formity of Nature to which they had been previously accustomed. It was natural in them to inquire, if, in future, that uniformity was to cease ; if, for the sins of the guilty race of Adam, the renovated world in which they were to begin their new career on the tomb of the old, was to be less stable, less governed by known rules than heretofore ; if, in short, the awful catastrophe, from which they had miraculously escaped, was to be the commencement of a new order of things, in which the immediate interference of the Almighty, to disturb the usual order of events, was henceforth to be frequent. The assurance they received, that no such change was intended, but that the world should continue as formerly, stable and uniform, and that the regular revolution of the seasons would be even more certain than ever, being secured by direct revelation, was of most material importance for the regulation of their future conduct as rational and moral agents.

In the 'Winter' volume, and towards the close of this, the reader will find some remarks on the doctrine of Providence, a subject which I do not mean at present to discuss. My object in this paper will be to show, that the government of rational beings requires the establishment of rigid and undeviating laws, and that, therefore, the existence of such laws, so far from disproving the superintending care of a paternal God, is just what might have been expected under His wise and beneficent administration.

Instead of entering into an abstract metaphysical argument on this subject, let us come at once to a practical view of it, and consider what would be the effect, were the seasons to be governed by laws not definite and precise. How would rational beings act under such circumstances ? Would a man toil if he could not calculate, with some degree of certainty, on obtaining the reward of his industry ? Would the farmer, for example, scatter the seed in the ground, if he did not expect that the rains of Spring would moisten it, that the sun of Summer would warm it, and that, by these genial influences, acting on a prolific soil, the grain would spring up and

ripen, and harvest would increase his stores ? Most assuredly not. But is not this expectation founded on his knowledge of the existence of general, and, within certain bounds, invariable laws ? He knows that God has endowed the soil with such qualities, that, if the proper pains be employed, it will cause the sown seed to germinate. He knows, further, that God has so ordered the seasons as to afford "the former and the latter rain," and to cause his sun to give forth his increased light and warmth at such a time, and in such a degree, as to enable the qualities inherent in the soil beneficially to operate ; and he knows, further, that the seed he sows is gifted with such a property, that, on the application of these means, it will not only develope its germ, causing its root to spread in the earth, and its leaves and stem to spring forth to the light of day, but that it will grow and expand, undergoing in its progress numerous changes, till at last it will yield a great increase of valuable grain, of the same nature as that which was buried, and appeared for a time to be lost in the earth. Were it not for the general laws thus impressed on the soil, the seasons, and the seed, the husbandman could have no such reasonable expectation. He would therefore cease to till and manure his soil ; and he would regard it as madness to waste his precious corn by strewing it on the ground. His occupation would be gone.

The business of the farmer, then, is the result of those beneficent general laws, which the Creator has impressed on his works ; and, if we now see the earth crowned with plenty, and smiling under its load of precious gifts, it is because experience has taught man that he who soweth in hope shall reap in joy.

This is but a single instance of a creative arrangement, the beneficial tendency of which is too obvious to need further comment. Were it not for the undeviating nature of those general laws by which earthly affairs are regulated, there could be no stimulus to industry in any department of art or science. Science, indeed, would have no foundation on which to rest. Its first principles would be destroyed, and it would cease to exist. Nor

would it be different with art. On what could human ingenuity operate, or for what end, if there were no fixed properties in natural objects, and no known result of any labor ?

General and permanent laws, then, are of the first importance in calling forth and exercising the faculties of rational beings. Without them society would stand still, and human beings, if they survived at all, would be as helpless, unintelligent, and dependent, as an infant in the arms of its mother. The depraved heart of man, however, perverts every thing ; and that very system, which is so beautifully adapted to the developement of our faculties, and the promotion of our happiness, has been so misrepresented and abused as to form an argument against the providential government of the Creator, or, where the argument was not formally stated, at least to leave a practical effect of a similar tendency on the mind. There is a very general impression, even among professing Christians, who would utterly reject the inference, if presented to them in the shape of a doctrine, that whatever occurs is the accidental or necessary result of natural causes ; by which means they practically exclude God from his works. They acknowledge the superintending providence of God. In the time of danger or of sorrow, they may shudder to think that they are suffering under his avenging hand, and they would willingly cast themselves into his arms, and repose in his bosom. But this is, with such persons, rather a superstitious than a religious feeling. It does not accompany them into the common events of life. It may occasionally fill them with terror, or cast around them a delusive security ; but it does not, under ordinary circumstances, elevate their souls with pious hope, nor warm them with gratitude, nor give a relish to their enjoyments.

In the operations of Nature, the laws of the Creator are so uniform, effects follow so directly from natural causes, that they are regarded rather as necessary results, than as indications of the beneficent government of a Father-God. The thoughtless and irreligious look no further, but content themselves with forming some vague

idea of unintelligent mechanical powers acting necessarily and independently. They even give this mechanical agent a name, and call it *Nature*, thus putting the effect for the cause, and deifying a mere system of unintelligent laws. And is it come to this? Shall we shut our eyes to the innumerable proofs which break in upon us on every side, of intelligence, and wisdom, and goodness? Shall the very plan which most distinctly displays these perfections, be employed to disprove them? Shall God be excluded from his universe, and an inconscious machine substituted in his place?

It does seem passing strange, not merely that the system of creation should be so perverted, but that the Gospel of Jesus Christ should be so glaringly abused. One would imagine that the religion, whose distinguishing characteristic it is to refer every thing to a God infinitely powerful, wise, and good, and which so emphatically declares, that not even a sparrow falleth to the ground without His appointment, and that He numbers the very hairs of our heads, would save even its nominal professors from this inconsistency. One would think, that, in whatever doctrine a Christian may err, he would at least be saved from erring in this; that, professing a faith which, in every page, reminds him of a particular providence, and which founds all its principles, and all its sanctions on this important truth, he could not but have his mind filled with a constant sense of the Divine presence, and be led to reverence and adore his Creator and Redeemer in every event of his life. But it is not so; and nothing assuredly tends to prove more forcibly the weakness of our nature, than this direct and most lamentable contradiction between principles and practice.

Should not this humbling view lead us to a deep searching of our own hearts, and cause us to cast ourselves on the guidance and support of Him, who knows and pities our infirmities, and whose strength is made perfect in weakness?

SECOND WEEK—MONDAY.

GLEANING.

In European countries, the humane practice prevails of permitting the poor to glean the corn-fields, after the reapers. It is a practice obviously founded on the Mosaic law, and is at least as old as the entrance of the Children of Israel into possession of the land of Canaan. By that law, the destitute inhabitants were permitted to glean three different kinds of produce,—that of the vine, that of the olive, and that of grain. With the view of rendering this law effective for the relief of the poor, it was required, that, after the olive-tree was beaten, the owner should not "go over the boughs again," and that, when the grapes were gathered, he should not "glean the vineyard afterwards;"—what was left, in both cases, becoming the property of "the stranger, the fatherless, and the widow." In like manner, and for the same object, when the farmer reaped his corn, he was forbidden to make "a clean riddance" of the corners of the field, or to gather any of the gleanings; and he was even enjoined to abstain from removing, for his own use, any sheaf, which, when carrying home his grain, he might inadvertently have left behind. Every one is acquainted with the beautiful and affecting story of Ruth, the Moabitess, in which this practice, as it prevailed among the descendants of Abraham, is graphically introduced. The benevolent intention of this law cannot be mistaken; and the custom, though not enjoined by the Gospel, is too conformable to its spirit to have been overlooked or neglected, in almost any quarter where Christianity has extended its influence.

On the subject of gleaning, as practised in England, the following sensible observations are extracted from the Journal of a Naturalist. "It may be difficult to comprehend how the picking up of a head of corn here,

and another there, should be a remunerative employ; but in this case, as in all other slow operations, a distant result, rather than an instant effect, must be looked for. I have found some little difficulty in obtaining intelligence sufficient to acquire a knowledge of the gain by this employ. The poor are often jealous and suspicious of the motives, when any attempts are made to procure information regarding their profits and improvements; and, indeed, the advantages of one year are uncertain in another. Catching, doubtful seasons, when the farmer collects in haste, and is unmindful of trifles, afford the best harvest to the gleaner. In fine, settled weather, the operation of reaping is conducted with more deliberation, and less corn is scattered about. When a woman, with two or three active children, 'lease'* in concert, it becomes a beneficial employ. I have heard of a family in the parish thus engaged, who have, in one season, obtained eight bushels of clear wheat; but this was excess. I know a single woman, also, who has gleaned, in the same period, four bushels and a half; but this, again, was under very favorable and partial circumstances. In general, a good leaser is satisfied, if she can obtain, single-handed, a clear three bushels in the season, which gives her about a bushel in the week; and, if taken at seven shillings, is a very reasonable, and far from being a very great, accession of profit, less perhaps than is generally supposed to be the emolument of the gleaner; and this may have been acquired by the active labor of eight or nine hours. Yet, such is the ardor of this occupation; the enjoyment of this full association with their neighbors; the prattle, the gossip, the glee, the excitement it occasions,—that I am sure the allowance of fourteen pence a day, certain and constant, would hardly be accepted by my leasing neighbors in place of it. Indeed, I would not offer it, believing that this gleaning season is looked forward to with anxiety and satisfaction, and is a season, too, in which the children of a family can contribute to its support, without pain and undue exertion; and viewing, with

* Glean.

much approbation and pleasure, this long-established custom."*

Mr. Knapp here alludes to the enjoyment of the gleaners in the harvest field; but there is a pleasure of a far purer and more interesting kind, arising from a domestic source. Let us figure to ourselves a poor widow, whose "bread-winner" has been removed from her head, while a family of little children were rising around her unable to labor, yet clamorous for food. We may imagine what privations she had to sustain, and what anxieties rent her heart, as, week after week, her hoarded winter stores rapidly diminished under the craving demands of numerous mouths, till, notwithstanding all the self-denial of a most rigid economy, and all the industry and ingenuity of maternal zeal, her scanty stock was at last exhausted, and her little ones claimed their accustomed portions in vain. But harvest is at hand; and, when they cry for food, while her own heart is ready to break, she soothes their importunity with the assurance of coming plenty. How they are enabled, under the pressure of such circum-

* Journal of a Naturalist, pp. 349—351. It is curious to observe the origin of ancient superstitions; and the reader will be amused to trace to its source a heathen legend connected with the practice of gleaning. Among the signs of the zodiac, Autumn was aptly represented under the emblem of a young female gleaner with an ear of corn in her hand, whence the brilliant star which marks that constellation is called in Latin, *Spica Virginis*. The Hebrew word for an ear of corn is *Shibboleth*, and the Arabic, *Sibbul*. The name of the ear was transferred to the virgin who carried it, and hence, by a trifling change, she acquired the wellknown name of *Sibyl*. "Nothing," says the author of *La Systeme de la Nature*, "can possibly be more simple than this name in its original. Fiction, however, in process of time grew fashionable; and what was only a symbol at first, was converted into a history. It was suggested that this Sibyl had been transported from the earth into heaven; and, in order to qualify her for her journey, they supplied her, in the figures by which they represented her, with a pair of spacious wings, and zealously asserted, that the spirit of God was infused into her, and that she foretold years of barrenness and plenty. From hence arose the *Erythræan* Sibyl. The history likewise of the *Persian* and *Cumæan* Sibyl was cast in the same mould. In short, all such women, or priestesses, as undertook to divine, themselves, or collect the prophecies of others, whether ancient and true, or modern and false, were looked upon as so many Sibyls."—Dialogue xv.

stances, to eke out a miserable existence, is a mystery which experience only can solve. But God thinketh on the poor and needy, and there are few who, in seasons of ordinary plenty, die of absolute want. At last, the harvest arrives, and the poor widow, attended by her little eager train, goes forth to glean with her basket under her arm. Hope glistens in her eye, and pleasure, long a stranger, fills her heart, while she instructs the little prattlers in their respective tasks. The labors of parental love are pleasant and unwearying, and the encouraging smile of a mother, as the burden swells, gives animation and eagerness to the competing toils of the childish laborers. Evening comes at last, and it is easier to conceive than describe the enjoyment which pervades that little family group, when, returning to their lowly roof, they proudly contemplate the fruits of their industry, and partake of the plenty which it has procured for them, while they talk over the incidents of this joyful day, and each has his tale of diligence and success to recount. Every benevolent mind must unite with Mr. Knapp, in viewing with "much approbation and pleasure," a custom which gives rise to such scenes as these.

Scripture assures us, that "the poor shall never cease out of the land;" and the truth of this, all experience teaches. A new country, such as America, indeed, appears to be, to a considerable extent, an exception to this rule. In the fertile and extensive regions of the Western World, where the population is as yet far from being filled up to the measure of the means of subsistence, there can never be any want of employment and of food to the industrious; though, even here, instances must and do occur of destitute old age and infirmity. In old countries, the case is different. There the demand for labor has been completely met by the supply, and the tendency of population to increase beyond the means of subsistence having created a superabundance of hands, a competition has taken place among the laboring community, in some respects salutary, but in others distressing, in its consequences. One unhappy effect of this competition is, that the aged, infirm, and incompetent, are superseded and

thrown out, so as to find no employment by which they might earn a livelihood; and, what increases the evil, although, as regards the individuals themselves, less to be lamented, the idle and the profligate come to be included in the list of the needy. Another effect of this struggle for subsistence is, that wages are lowered beneath their due proportion to the necessities of the people; so that persons with large families, in districts where children cannot find ready employment, are subjected to great privations.

These, and other circumstances, into which I cannot stop to inquire, have occasioned a result, which, on a cursory view, must seem surprising and unexpected,—that poverty does not diminish in proportion to the prosperity of a community, but, on the contrary, has a tendency in some respects to increase. There is, perhaps, no problem of political economy more difficult of solution, than that which relates to the mode of supplying the wants of the poor. That something should be done by the rich to alleviate the distresses of their destitute fellow-creatures, is an obvious dictate of common humanity, which few will be inclined to dispute. But how the relief can be systematically afforded, without eventually aggravating the evil, is a question of grave import and nice investigation. The difficulty lies in this, that wherever there are known and accessible means of supply, these means will be relied upon, so as to increase the population, and hence permanently to increase the demand: while, at the same time, expectations will be created, and wants will be felt and brought to light, which otherwise would have been resisted and subdued. The result has been remarkably exemplified in the working of the English Poor Laws,—a system founded on the purest principles of benevolence, but defective in political sagacity. The evils of this system have, within the last century, become so glaring, that English legislators have found it necessary to retrace the steps of their predecessors. But the attempt is arduous as well as painful. There is no evil more hard to cure, than that which arises from a vicious and inveterate system of legislation.

To the practice of gleaning, the objections do not apply which experience has proved to attach to the provisions of the English Poor Laws. It is limited in its extent, is somewhat precarious in the amount of the supply, and yields a return proportioned to the labor and diligence employed. In all these particulars, it differs from the legislative measure in question, and in every respect, the difference is salutary. I say nothing of the circumstance, that in Great Britain it is not compulsory; for a long-established custom differs in that respect little from a legal enactment. Among the Israelites, although gleaning had all the sanction and authority of a sacred law, we do not find that it was ever abused so as to be productive of evil effects. In the nature of the thing, indeed, it was only calculated to be beneficial; and it is one of those Mosaic institutions, which seem not to have arisen from the peculiar circumstances of that chosen people, but which are of universal application.

SECOND WEEK—TUESDAY.

THE HARVEST MOON.

The moon, in her path through the heavens, moves with great apparent irregularity, sometimes extending her course high towards the zenith, and at other times sinking low, and, as it were, reluctantly leaving the verge of the horizon. In the time of her rising and setting there is also continual change, which causes a constant variety in her phases; insomuch, that poets have taken this luminary as an emblem of fickleness and caprice. Her motions, however, are regulated by strict mechanical laws, which can be calculated and predicted with the utmost exactness; and hence it follows, that in all her changes there is, after all, a most precise uniformity. She is, indeed, acted on by many countervailing forces, and the theory of her motion is consequently very complicated. The earth is the centre of her orbit, round which she

moves at the distance of 237,360 miles, in an ellipse of considerable eccentricity; but the sun and the planets act upon her by their attraction, with great and opposing power, disturbing her movement in every part of her course. The sun, in particular, though removed from her four hundred times further than the earth, is of such vast comparative magnitude, that were she by any accident placed but a very little nearer him, she would cease to be an attendant of our globe, and would revolve round him an independent planet. He is therefore continually producing a sensible effect on her motions, increased, of course, when she is in conjunction with him, and diminished when she is in opposition, and this, again, depending for the measure of its intensity on her relative distance from the earth at the time. I mention these facts without any intention of entering more minutely on this most difficult of all our planetary investigations, but merely with the view of calling the reader's attention to the wonderful balancing of forces on which our system rests, and thus to present to his contemplation the power and wisdom of that infinite Being in whose hand the balance rests.

I have at present been led to notice the motions of the moon, on account of a remarkable result of these motions during the season we are now considering. Light is of vast importance to the operations of harvest; and it is so ordered, that during two of the autumnal months, the moon rises full, and generally with very peculiar splendor, for several nights in succession, a circumstance which does not occur in any other period of her annual course. Astronomers inform us that this effect arises from the peculiar position of the moon's nodes, with reference to the earth's orbit; but the farmer, unskilled though he be in the wonders of science, goes deeper, wisely and piously attributing the arrangement to the superintending care of God. There is no period of the year in which the light of the moon is of such utility; and, that its brightness should be increased and prolonged at this precise period, cannot, by any person accustomed to think of final causes, be regarded as accidental. It is, if you will, a necessary consequence of the laws of gravita-

tion and inertia, acting on a body under the conditions of this satellite. But these conditions are not necessary, but arbitrary; and the period of the year in which the phenomenon occurs is not necessary, but arbitrary; that is to say, the size of the moon, the relative place which it occupies in the heavens, the velocity and direction of its projectile force, might each have been different from what they are, and any one of these circumstances being changed, would have materially changed the whole lunar system; or, supposing these conditions to have remained unaltered, the phenomenon, as respects the mechanical forces employed, might equally have taken place in any other season of the year, as in autumn. When we find it, therefore, actually to occur at the only period in which it could be of essential benefit, we assuredly have a sufficient reason for ranking it among those beneficent contrivances, in which the system of Nature, when viewed both on the largest and the most minute scale, is discovered to abound.

The unusual brightness of the moon in the autumnal season, to which I have alluded, is doubtless owing to the state of the atmosphere, which is now remarkably free from those exhalations that serve to render it less pellucid at most other periods of the year. The long droughts of summer have exhaled much of the moisture of the earth, while the decreasing heat serves to check the evaporation, so that the air is at this time in general very dry, which circumstance not only increases the distinctness of vision during the day, but gives peculiar beauty and power to the moon's soft radiance by night. No person can, without emotion, observe this beautiful satellite, in her autumnal glory, rising slowly above the horizon, while the whole eastern sky glows with her beams, and, as her broad disc emerges from behind the trees of the forest, seems "a phœnix's nest on fire." The sun has already set in his grandeur behind the western hills, and the last traces of his rays have gradually vanished from the golden clouds which adorned his going down; the stars have begun to hang out their silver lamps, and a pleasing shade is spread over the face of

the earth, when the moon, majestically appearing in the opposite quarter, sheds her silver light, to be softly reflected from mountain, tower, and tree, to sleep in the silent valley, and to enlighten the labors of the harvest field.*

There cannot be a more picturesque or animating sight, than that of a busy group of reapers, plying their cheerful task under the pale rays of the conscious moon, unless it be that of the kindred employments of the barn-yard, where the loaded wains, breaking the wonted silence of night with their rumbling sound, arrive one after another to swell the ample stack, and to crown the labors and realize the hopes of the husbandman. Every thing contributes to give a kind of enchantment to the view. The sheaves, thrown gracefully from the pitchfork, in the softened light; the busy hands of the builder, skilfully disposing them as they fall by his side; the patient horse, standing in the cart motionless, and, with drooping head,

* [The spirit of this picture seems to have been caught from the following beautiful description of the same object, which the Editor copies from Howitt's 'Book of the Seasons.'

"Whilst speaking of harvest, I must not omit to notice the splendid appearance of the HARVEST MOON. The circumstance of this moon rising several nights successively almost at the same time, immediately after sunset, has given it an importance in the eyes of farmers; but it is not the less remarkable for its singular and splendid beauty. No moon during the year can bear any comparison with it. At its rising it has a character so peculiarly its own, that the more a person is accustomed to expect and to observe it, the more it strikes him with astonishment. I would advise every one who can go out in the country, to make a practice of watching for its rising. The warmth and the dryness of the earth, the clearness and balmy serenity of the atmosphere at that season, the sounds of voices borne from distant fields, the freshness which comes with the evening, combine to make the twilight walk delicious; and scarcely has the sun departed in the west, when the moon in the east rises from beyond some solitary hill, or from behind the dark rich foliage of trees, and sails up into the still and transparent air in the full magnificence of a world. It comes not, as in common, a fair but flat disc on the face of the sky,—we behold it suspended in the air in its greatness and rotundity; we perceive the distance beyond it as sensibly as that before it; and its apparent size is magnificent. In a short time, however, it has acquired a considerable altitude; its apparent bulk has diminished, its majestic grandeur has waned; and it sails on its way calmly beautiful, but in nothing differing from its usual character."—AM. ED.]

waiting his driver's signal to renew his toil, while the broad deep shadows which fall from every object, are beautifully contrasted with the brightness of the reflection on the opposite side; these, joined with the sounds of bustle and enjoyment which, at that unusual time of the night, are ever and anon heard from every quarter; all unite to give a peculiar and very delightful character to the scene.

Rural employments are, in general, pleasing in themselves, and the associations with which they are connected lend them an additional charm; but I scarcely know of any agricultural operation which combines so many sources of agreeable sensations as the moonlight labors of the farmer, in the calmness and sweetness of an autumnal night. It wants but one accompaniment to render it complete and inexpressibly sublime; and that is the voice of prayer and praise ascending from the roof of the pious laborer, when, after the useful toils of the day, he "returns to bless his household." Why, in these days of greater prosperity and peace, do we so seldom hear those sounds, which, in the days of our persecuted forefathers, spoke from every cottage, of humble thankfulness, of domestic harmony, and of hope which stretches its view beyond the fleeting things of earth?

SECOND WEEK—WEDNESDAY.

HARVEST-HOME.

THERE is no season which, in every age, has been attended with more rejoicing than that in which the labors of harvest are completed, and all the produce of the fields is safely stored in the barn-yard. The farmer and his dependants are then in a peculiarly joyous mood. They sympathize with each other on the accomplishment of an important work, which to him has been the subject of much anxiety, from the time the grain was first deposited

in the earth ;—and to them has afforded a period of toil at once exhilarating, healthful, and profitable.

This happy event has, therefore, from the earliest times, been almost universally celebrated by some kind of festivity, often attended with religious ceremonies. The Israelites, all whose institutions were of a religious nature, both began and ended their harvest with public acts of devotion. On the second day of the Passover, occurred what was called the day of *First Fruits*, this being the period when the barley was nearly ready for the sickle. On that day, a sheaf of barley, publicly reaped, was given to the priest ; which, being threshed, winnowed, dried, and ground, was partly heaved and waved, with oil and frankincense, partly burnt on the altar along with a lamb, offered in sacrifice. After this religious ceremony, the Israelites were permitted to commence their harvest. Five weeks subsequent to the day of *First Fruits*, came the feast of *Pentecost*, one object of which was to celebrate the blessing of the finished harvest. On this occasion, three burnt-offerings and a peace-offering were successively presented on the altar, and, along with the latter, were offered two loaves made of fine flour leavened. When the vintage was finished, this propitious event was celebrated by the feasts of *Trumpets* and *Ingathering*, which latter corresponded with the feast of *Tabernacles*. During these solemnities, much hilarity was mingled with the devotional exercises of the Hebrews, and their public thanksgivings were accompanied with domestic demonstrations of joy, and acts of kindness and festivity.

While, in almost all other countries where the inhabitants have advanced to the agricultural state, the bounties of harvest have called forth public expressions of enjoyment and gratitude, our own forefathers were not wanting in such expressions. Although, in the habitual temperament of the British population, there is perhaps less liability to excitement, and a more sober cast of thought, than exists among some of their continental neighbors, there are also circumstances in their climate and insular situation, which render the produce of the soil a matter of peculiar attention and anxiety. The weather is more

precarious than in most of the adjoining countries; and consequently, the prosperous consummation of the harvest more uncertain. When the labor is happily accomplished, therefore, there is the greater cause of joy. Although, in common years, they rarely depend on foreign importation for the first necessaries of life, yet, when the harvest is scanty, this dependence is great and distressing. Both in a national and private point of view, therefore, an abundant and well-secured harvest is a cause of peculiar thankfulness. To the farmer, it affords prosperity, to the proprietor, assurance that his rents will be paid, to the poor and laboring classes, a promise of cheap provisions, to the whole community, freedom from the disadvantages of having recourse for a supply of food to a foreign, it may be, a hostile market.

It is not surprising, therefore, that the time of harvest-home has always been considered, in that country, as a season of rejoicing. It is curious to observe a similarity of customs in different nations, while it is frequently difficult to assign any probable origin to the ceremonies handed down from the obscurity of remote antiquity. Some of these are such as may have naturally suggested themselves by the circumstances of the case, independently and without intercommunity; but there are others of so peculiar a nature, as to indicate transmission from country to country, and to point to a period, however remote, when those nations, among whom the practice exists, were united by some common tie. In this view they acquire an importance which would not otherwise belong to them, and become objects of interesting investigation to the historian and the antiquary. Of this latter kind, may, perhaps, be considered the ceremony of decking with ribands a sheaf or handful of corn, made generally to resemble as much as possible a female figure,* and suspending it in some conspicuous place during the harvest-home festival.

This custom is very general among European nations, as regards its essential feature, though, in different coun-

* Is it from heathen times that this custom is derived, and is this the image of Ceres, the goddess of corn?

tries, it differs as to its details. In Scotland, for example, it is the last cut handful which is thus honored, and he who is dexterous enough to carry off this prize, is said to have "won the kirn."* In England, the stalks of corn to be preserved, are those taken last from the field, at the conclusion of the *ingathering*. They are carried on a pitchfork in a kind of procession, which usually takes place when the last load of corn is borne from the field. Much ceremony was formerly employed on that occasion. The stock-cart, as it was called, came home with a burden covered with a sheet, while all the horses were ornamented in a similar manner, and the laborers followed from the field, crowned with ears of corn, and singing, "Harvest-home." The following simple lines of Herrick, describe some other ceremonies which attended this rural procession.

> "Some bless the cart, some kiss the sheaves,
> Some prank them up with oaken leaves;
> Some cross the thill-horse; some with great
> Devotion stroke the home-borne wheat;
> While other rustics, less attent
> To prayers than to merriment,
> Run after with their garments rent."

The superstitions which these observations indicate, are happily fast passing away under the light of a purer Christianity. It were well, however, if a more ardent and manly piety could be said to supply their place; for it is one thing to reform a creed, and another to imbue the heart with devotional feeling.

In this, as in other agricultural customs, an obvious change is rapidly taking place. The old ceremonies which graced the harvest-home are disappearing, one by one; and even the festive enjoyment, with which the season was crowned, "the joy of harvest," as it is emphatically called in Scripture, will probably soon be known only as a subject of tradition or of history. Whether

* This expression probably arises from the ancient custom of producing at the feast, which followed the conclusion of the reaper's toils, a quantity of half-churned cream, newly taken from the churn, or as it is in Scotland named, "the kirn." The feast itself is, from the same circumstance, called the "kirn."

this will turn out to be for the advantage of rural morals or otherwise, I shall not stop to inquire.* The growing change, at least, indicates a striking feature in the character of the age, which is rapidly throwing off all regard for antiquity, and even passing to the opposite extreme. If the pious mind did not find consolation in beholding, in this restless state of society, proofs of the fulfilment of prophecy, and did not assure itself that there is an unseen "Governor among the nations," the prospect would appear ominous, and full of terror. Nothing can be more tremendous than the anticipation of human society thrown loose from all moral and religious restraint, and rampant with the insane love of change. We need, however, entertain no such gloomy fears, because we know that the progress of society is leading to the most glorious results. If, in that progress, we should sometimes find that the breaking down of ancient customs, trifling though they be, is a symptom that the foundations of society are unsettled, it is, at the same time, an indication that better times are approaching, when, after overthrow and turmoil, a surer and firmer basis shall be laid for the happiness of the human race.

SECOND WEEK—THURSDAY.

STORING OF CORN.

We must regard it as another instance of beneficent contrivance, that the various kinds of corn are more easily

* [I cannot find that, in New England, there are any ceremonies accompanying the gathering-in of the harvest. Our puritan ancestors probably left all such behind them when they quitted the mother-country, regarding them as heathenish or popish. The very phrase, "harvest-home," seems to have fallen into disuse among us. It is to be regretted, that, in parting with what was puerile or pernicious in old customs, we could not have retained what was poetical and innocent. We have, indeed, toward the close of autumn, when the Indian corn, which has been previously harvested, is to be deprived of its husks, our "husking frolics," as they are called, which are very pleasant meetings of neighbors, commencing in the social labor of husking, and ending in a feast; but though there is merriment and good cheer at these huskings, there is little or no ceremony.—Am. Ed.]

preserved than almost any other species of food. Man is so dependent on this article, which forms the material of what has been appropriately called the staff of life, that, if it were subject to those disadvantages which render the storing of most other edible substances difficult and precarious, very calamitous consequences might ensue. Indeed, it is the facility it affords for storing which gives to corn one of its most distinguishing advantages, and, combined with its nourishing qualities, has raised it to the rank it has always held among the articles of human subsistence. There are chiefly two properties on which this facility depends, both of them intimately connected with the close and careful packing, as it may be called, which Nature has given to the farinaceous substance it contains. The one, is its capacity of being stored in small bulk, and the other, its quality of being easily preserved from decay. Each grain of corn may be regarded as a little package, wrapped neatly and tightly up in its own cover, and so kept from immediate contact with the surrounding mass, as well as from the external atmosphere, both of which would prove injurious. The importance of this compact form will distinctly appear, if we only attend to the difference produced by the breaking up of these natural parcels, when the corn is reduced to the form of flour or meal by passing through the mill. The very same substance is now rendered difficult of preservation, becoming liable to many accidents, from which, in a state of grain, it is easily defended.

It was not, however, the intention of Providence that man should possess almost any advantage without the exercise of his own labors and ingenuity; and the same care to stimulate and reward skilful industry, which we find in the processes of agriculture, is extended to the management of the grain after it is removed from the field into the barn-yard and the granary.

When the corn is properly secured in the stack, it may be preserved for years without further attention, if care has only been taken to place it so as to be free from the depredations of rats and mice, which may be effected with ordinary attention. The straw is itself an excellent pre-

servative, by keeping the grain separate, and free from injurious atmospheric influences, under an equable heat; and the farmer well knows the advantage which arises from suffering his grain to remain unthreshed till he has occasion to send it to market, or apply it to use.

The mode of separating the corn from the straw has undergone many improvements. The ancients performed this operation by causing oxen to tread upon the sheaves, or by drawing a heavy carriage over them, both of them awkward, and not very efficient contrivances.* A more advantageous, but at the same time a more tedious and laborious method of later times, was the use of the flail, which, indeed, is still employed where farms are of small extent. Within the last half century, however, after machinery had made great progress in almost every species of manufacture, that power came at last to be applied to this agricultural object; and now a threshing machine has come to be an indispensable appendage to every farm of even moderate size.

After the grain has been thus disengaged from the ear, it is separated from the chaff by means of fanners, an improvement on the ancient method of winnowing in the wind, and is then removed into the granary. Here it requires frequent turning and winnowing for the first six months, to keep it from the effects of moisture, and from the depredations of insects. After this period, it has acquired such hardness as to demand less labor and attention, and, provided it be kept dry, may, with moderate care, be preserved for many years.

In the 'Memoirs of the French Academy of Sciences,' for 1708, it is mentioned, that in the preceding year, a magazine of corn was opened in the castle or fortress of Mentz, which had been lodged there in the year 1578, and that the bread which was made of grain thus preserved for a period of one hundred and thirty years, proved to be excellent. Another instance of the same kind is recorded by the Abbé de Louvais, who, when travelling to the fron-

* The Italians and inhabitants of Gascony, till lately, employed wains and sledges in this manner. Perhaps the custom may not yet be altogether abandoned.

tiers of Champagne, was conducted to a magazine of corn in the castle of Sedan, which had been laid up there for more than a century. The store had suffered some injury from damp, but the greater part of it was made into bread, and turned out to be perfectly sound.

The author of the 'Spectacle de la Nature,' who states these facts, founds on them a proposal for the erection of public magazines, in which quantities of grain should be constantly kept stored up at the expense of the government, and under its superintendence, to be only opened for sale during years of threatened scarcity. This proposal, which reminds us of the method of avoiding a similar calamity adopted in Egypt by Joseph, is so reasonable, that it seems surprising it is not more frequently acted on. In Spain and Russia, indeed, this precaution against scarcity has been taken to a considerable extent, and I believe in some other continental countries also.* "Though an attempt of that nature," says the ingenious but somewhat antiquated author alluded to, "might seem ridiculous in such a country as France, yet it must be acknowledged, that such an expense, were it once defrayed, would, in case of the failure of crops, not only secure the poor and needy from paying exorbitant prices, and the rich from the insults of an incensed populace, but preserve both from a public calamity, which is shocking in its nature, obliges thousands to remove out of the land, and exposes such as stay behind to frequent tumults and the most malignant distempers."†

* The Mark-Lane Express for 20th April, 1835, says, "In foreign countries, magazines of grain are erected by government in different parts of the kingdom, to provide for a scarcity. In Spain, there are upwards of five thousand of these depositories. Every occupier of land is compelled to bring in a certain quantity of corn, proportionate to the size of his farm. In the following year, he takes back the corn, and replaces a larger amount of the new growth. Thus he continues annually to increase the stock by these contributions, until a certain measure of grain is deposited. Then each party receives back the whole of the corn he has furnished, returning in lieu of it an equal quantity of new corn."

† Dialogue xv. Both in this and the twelfth Dialogue, the author mentions a method by which grain may be effectually secured, that it

Having mentioned this author, of whose sensible observations I have more than once availed myself, I shall conclude the present paper, by quoting the striking remarks with which he closes his dialogue on corn. "We have had recourse to a thousand expedients to secure the enjoyment of this grain, and to alleviate the labors it costs us. We employ hard and polished instruments to facilitate the toil of rearing it, and consign the most painful part of the fatigue to horses and oxen. We accelerate the necessary motions and despatch of husbandry by wheels and levers, and a hundred other machines, which are useful in gathering, threshing, transporting, grinding, and baking. But, as dexterous and inventive as man has been for the mitigation of his labors, and the frugal management of his time, corn, which is the best and most necessary nourishment, obliges him to submit to a perpetual round of inevitable toils. It is here that the Deity has made necessity prevail over indolence, more than in any other instance whatever; and although his Providence alone increases what man endeavors to propagate by plantation and culture, He is more desirous to conceal his gifts and benefactions under the veil of human labor, than to render us inactive by supplying us with a constant flow of liberalities, which would only cost us the pains of collecting them together."

SECOND WEEK—FRIDAY.

BIRDS.—THEIR STATE IN AUTUMN.

THERE are several peculiarities incident to the state of the winged tribes in this season, which require some notice.

may not be improper to notice. This method is to cover the heap, after having been two years exposed to the action of the air, with a thin surface of quicklime, which is then to be dissolved by sprinkling it over with a small quantity of water. "This lime causes the grains to shoot to the depth of two or three fingers, and encloses them with an incrustation, through which neither air nor insects can penetrate."

The breeding season is now over, but many of the young broods still receive the tender care of the mother bird. Their parental employment has been assigned as one reason of the general silence of these delightful musicians of the grove during the months of autumn. Whatever truth there may be in such a reason, there can be no doubt of the fact. With the exception of the few birds mentioned in a former paper, there are scarcely any of our native songsters which exert their musical powers at this season. They may be seen, however, flying in flocks or in families ; and it is interesting to remark the judicious and tender attentions of the parent to the instruction of the young. The chief care of the migrating birds seems to be, to prepare their brood for their long and perilous journey. As if anticipating the necessity of a powerful and accustomed wing, they urge them to frequent flights, and incite them, by various arts, expertly to employ the power bestowed on them by the Creator, of finding their way through the trackless air.

Every thing is mysterious in the operations of instinct, and leads us directly and irresistibly from the creature to the Creator. We cannot believe that the feathered tribes, with their stinted faculties, have any real knowledge of what either they themselves, or their young ones, may require in encountering their distant aerial voyage ; nor can it easily be supposed, indeed, that they have any previous anticipations as to the nature and extent of the journey they have to undertake. They do not reason, and form resolutions, in the same way as man. Whatever may be said of those occasional deviations from the practices of their species, and those accommodations to circumstances, which appear to imply a higher principle, there can be no doubt that all their great and common movements are nothing more than instinctive impulses. Among this number must be ranked their migratory propensities ; and it is doubtless the same principle which incites them to take the preparatory steps. They train their young to flight, without knowing why. This is the first part of that unreasoning impulse to change their residence, impressed upon them by the Supreme Intelligence

—a Divine energy, the object of which they do not understand, but which most wonderfully guides them to the previous means, as well as to the ultimate action.

The following beautiful verses of an American poet, addressed to a Waterfowl, finely allude to this instinct of migration, and to the feelings it ever ought to inspire.

"Whither, 'midst falling dew,
While glow the heavens with the last steps of day,
Far, through their rosy depths, dost thou pursue
Thy solitary way?

Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly painted on the crimson sky,
Thy figure floats along.

Seek'st thou the plashy brink
Of weedy lake, or marge of river wide,
Or where the rocking billows rise and sink
On the chafed ocean side?

There is a Power whose care
Teaches thy way along that pathless coast,—
The desert and illimitable air,—
Lone wandering, but not lost.

All day thy wings have fanned,
At that far height, the cold thin atmosphere,
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

And soon that toil shall end;
Soon shalt thou find a summer home, and rest
And scream among thy fellows; reeds shall bend
Soon o'er thy sheltered nest.

Thou 'rt gone; the abyss of heaven
Hath swallowed up thy form; yet on my heart
Deeply hath sunk the lesson thou hast given,
And shall not soon depart.

He who, from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone,
Will lead my steps aright." BRYANT.

It is chiefly during the months of autumn that these remarkable migrations take place, which I have noticed in the 'Winter' volume. On this subject, all that remains for me, at present, is, to state a few particulars,

referring the reader to that part of the work for more general details of the nature and principle of this very remarkable movement.

On looking over a list of British birds, which migrate during the course of this season, I find that there are thirteen different kinds which leave the country in August, twenty-nine in September, and nine in October; while, neither in the preceding nor the subsequent months, are there any departures. On the other hand, the place of these emigrants is supplied from the north, by fifteen species which arrive in August, ten which arrive in September, and eight which arrive in October. Numbers also arrive during the winter months, of which seven kinds appear in November, seventeen in December, and five in January.

It is worthy of remark, that of the birds which leave the British shores during autumn, upwards of thirty species frequent the heaths and woods, or the fields, hedges, and gardens; while but a few are inhabitants of the shores, lakes, and rivers; whereas, of those which visit the country, at this season, to become winter residents, there are but eight species which do not haunt the water, most of these being found on the seabeach. The reason for this it is not difficult to understand. In winter, the food of birds becomes scarce in the hills, valleys, and forests; but it is otherwise in the marshy and inland waters, and on the shores of the ever-flowing and ebbing sea, where various inhabitants of the watery element are generally accessible; always indeed on the beach during the reflux of the tide, and in other places, when the frost is not so intense as to bind even the fountains and running streams in icy chains. It is striking to observe the economy of Providence in this respect. He has sent the summer birds to southern climes, in search of the food which is ready to fail them, while, from sterner regions, He has invited fowls of other wing, and other habits, to reap the new harvests which He has provided for them, in conformity with their constitution, and the peculiar nature of the locality, and the season.

One of the most interesting and familiar tribes of birds

is that of the swallow. It consists of several distinct families, whose habits are various. Of these the martlet, or swift, departs among the first of the feathered race. The following remarks on this migration, extracted from the 'Mirror of the Months,' are worthy of notice. "In the middle of this month, (August,) we shall lose sight entirely of that most airy, active, and indefatigable of all the winged people, 'the temple-haunting martlet.' Unlike the rest of its tribe, it breeds but once in the season; and its young having now acquired much of their astonishing power of wing, young and old all hurry away together, no one can tell whither. The sudden departure of the above singular species of the swallow tribe, when every thing seems to conform together for their delight; when the winds are hushed, and the summer still lingers, and the air, in which they feed, is laden with plenty for them, and all the troubles and anxieties attendant on the coming of their young broods are at an end,—that, at the very moment when all these favorable circumstances combine to make them happy, they should suddenly disappear, is one of those facts which have hitherto baffled all inquirers. All that we can make of this mysterious departure, is, to accept it as an omen, the earliest and most certain, that the departure of summer is nigh at hand."

There is yet another, and a more important truth which we may confidently deduce from this phenomenon, when we view it in connexion with the lessons taught by other analogies, which is, that the instinct that leads these aerial travellers so suddenly, and without any known material cause, to take their flight from our shores, doubtless directs them to regions where a still more abundant supply of grateful food is provided for them; where their presence is necessary for preserving the due balance of nature, by the destruction of the insects of another climate, and where they can securely spend the winter-months amidst a profusion which would soon have been denied them in their native haunts. We may not certainly know that Africa is their destination, although the presumptions for this belief are pregnant; but we do certainly know that, to whatever quarter they migrate, they

are directed thither by a wisdom far superior to their own.

The other swallow tribes disappear at a season considerably later. The following account of the habits of the house swallow, on the eve of its departure, which first appeared in the 'Sheffield Mercury,' is too interesting and characteristic to require any apology for its insertion.

"Early in the month of September, 1815, that beautiful and social tribe of the feathered race, began to assemble in the neighborhood of Rotherham, at the Willow Ground, near the Glasshouse, preparatory to their migration to a warmer climate, and their numbers were daily augmented until they became a vast flock which no man could easily number,—thousands and tens of thousands; so great, indeed, that the spectator would almost have concluded that the whole of the swallow race were there collected in one vast host. It was their manner, while there, to rise from the willows in the morning, a little before six o'clock, when their thick columns literally darkened the sky. In the evening, about five o'clock, they began to return to their station, and continued coming in from all quarters till near dark. It was here that you might see them going through their various aerial evolutions, in many a sportive ring and airy gambol, strengthening their pinions, in their playful feats, for their long journey. A thousand pleasing twitters arose from their little throats, as they cut the air, and frolicked in the last beams of the setting sun, or lightly skimmed the surface of the glassy pool. The notes of those that had already gained the willows sounded like the murmur of a distant waterfall, or the dying roar of the retreating billow on the seabeach.

"The verdant enamel of summer had already given place to the warm and mellow tints of autumn, and the leaves were now fast falling from the branches, while the naked tops of many of the trees appeared; the golden sheaves were safely lodged in the barns, and the reapers had, for this year, shouted their harvest-home. Frosty and misty mornings now succeeded, the certain presages of the approach of winter. These omens were understood by the swallows, as the route of their march. Ac-

cordingly, on the morning of the 7th October, their mighty army broke up their encampment, debouched from their retreat, and rising, covered the heavens with their legions. Thence, directed by an Unerring Guide, they took their trackless way. On the morning of their going, when they ascended from their temporary abode, they did not, as they had been wont to do, divide into different columns, and take each a different route, but went off, in one vast body, bearing to the south."*

SECOND WEEK—SATURDAY.

THE WOODS.—THEIR AUTUMNAL APPEARANCE.

UNDER the title of 'the woods,' will be found in the 'Spring' volume some general observations, on the appearance of silvan scenery in that delightful season, when Nature first bursts her winter cerements, and comes smiling forth from her annual tomb. The attractions of the woods are not diminished during the autumnal months, although they are changed. They have ceased to give rise to those pleasing associations which connect them with the simplicity and innocency of infancy in all the loveliness of its opening charms, and which bestow so tender an interest on the scenery, while its beauties are still but partially developed. Every tree and shrub is now

* A friend who is an accurate observer of Nature, and a wellknown antiquarian, has sent me the following notice of a migration of larks, and other small birds, which he witnessed between twenty and thirty years ago, while residing in the parish of Jarraw, in the county of Durham, which lies along the seacoast. "Fine open weather lingered on till the middle of the winter quarter, when, in a still calm night, snow fell uniformly over the whole island to the depth of several inches, and was succeeded, for two days, by a glittering frost. During the whole of these days, especially on the first, innumerable quantities of larks, and other small birds, not in flocks, but in one continued stream, directed their flight all day due south. They kept so near to the earth that at every hedge they had to rise. A few days after, the London newspapers mentioned that larks had been taken in such quantities in the neighborhood, I think, of Dunstable, or some part of Bedfordshire, that they sold at a very small price by the score."

in the full flush of its vegetable pride, and while it waves in the gentle breeze, displays the peculiar characteristics of its species, not merely in the form of its varied outline, but in the shape and color of its leafy honors. The delicate green, which pleased the eye when the leaves first unfolded themselves from the bud, has, before the arrival of this season, been exchanged for a deeper shade; and the whole assemblage of trees has now assumed a graver cast, indicating maturity, and already pointing to the period of approaching decay.

There is, however, a peculiarity in the commencement of this season, which forms an exception to the remark just made. A new flow of the sap takes place in the end of July, or beginning of August, which seems as if it were the flash of the expiring lamp, the last struggle of Nature to rally its sinking powers, and to prolong the vegetative process. This gives rise in numerous species of trees to new shoots, easily distinguishable by the lively color of the young buds and leaves. The appearance produced by this expiring effort is thus graphically described in the 'Mirror of the Months.' "The woods, as as well as the single timber trees that occasionally start up with such fine effect from out the hedge-rows, or in the midst of meadows and corn-fields, we shall now find sprinkled with what at first looks like gleams of scattered sunshine lying among the leaves, but what, on examination, we shall find to be the new foliage that has put forth since midsummer, and which, in places, yet retains all the brilliant green of spring. The effect of this new green lying in sweeps and patches upon the old, though little observed in general, is one of the most beautiful appearances of the season. In many cases, when the sight of it is caught near at hand, on the sides of thick plantations, it is perfectly deceptive, and you wonder for a moment, while the sun shines bright every where, it should throw such a still brighter beam upon these particular spots."

As the season advances, this effect disappears, and symptoms of a failure in the powers of vegetation become obvious. Each stately tenant of the forest acquires its

own peculiar and distinctive autumnal hue; and the variety of shades with which every successive change of temperature in the declining year more and more diversifies them, at once pleases the taste, and fills the mind with that gentle and agreeable sadness which is so congenial to the period of incipient decay.

Mr. Gilpin, who saw Nature with the eye of an accomplished artist, has some appropriate remarks on the appearance of the woods towards the close of autumn, which I gladly transcribe. "Painters," says he, "have chosen autumn, with almost universal predilection, as the season of landscape. The leafy surface of the forest is at that period so varied, and the masses of foliage are yet so full, that they allow the artist great latitude in producing his tints, without injuring the breadth of his lights.

> "'The many-colored woods,
> Shade deepening over shade, the country round
> Imbrown; a varied umbrage, dusk and dun,
> Of every hue, from wan declining green
> To sooty dark.'*

* [We must remember that the above is a description of the autumnal woods of England, and not of the autumnal forests of New England. Ours are indeed "the many-colored woods," but "a varied umbrage, dusk and dun," are not the words to convey any idea of them. In localities where certain trees predominate, the forest absolutely flames with lights and hues, which have no counterpart in natural scenery, except in those which sometimes tinge the clouds as they gather round the setting sun. It seems as if all the brightest flowers of spring and summer had revived again, to be hung upon the forest boughs, and grace the departure of the year; for this glory is but the prelude of death, and the preparation for a funeral. On entering our woods at this season, one might think that he was walking down the aisles of some vast cathedral. The sun shines through the foliage, as through old tinted windows, suffusing the air with warmth, and color, and worship.

The change from the deep summer green to the splendid variety of autumn, is sometimes produced in a single night, by the silent but all powerful ministry of frost. But the superior gorgeousness of the foliage is owing not so much to any peculiarity of climate, as to the peculiar character of some of our native trees. Among those which contribute most strikingly to the show, are the maples, and the tupelo, erroneously called hornbeam, the former bringing their vivid yellows and scarlets, and the latter its deep crimson. The wild creeper too, the ivy of our country, though not ivy, festoons the gray rocks and dark stumps with purple and crimson wreaths; and the ferns do their

"Of all the hues of autumn, those of the oak are commonly the most harmonious. As its vernal tints are more varied than those of other trees, so are its autumnal. In an oaken wood, you see every variety of green, and every variety of brown, owing either to the different exposure of the tree, its different soil, or its different nature. The deep orange tint of the beech is, perhaps, after all, the most beautiful of autumnal colors. I have known many planters endeavor, in their improvements, to range their trees in such a manner as, in the wane of the year, to receive all the beauty of autumnal coloring. The attempt is in vain, unless they could so command the weather, as to check or produce at pleasure those tints which Nature hath subjected to so many accidents. A general direction is all that can be given; all must be left to chance; and, after the utmost that art can do, the wild forest, with its usual discords and monotonies, will present a thousand beauties which no skill of man can rival."

Nothing can be more true, or come more directly to the heart of a lover of rural scenery, than this last remark. The wild and free in the landscapes of Nature afford a charm, too deep, perhaps, for the mind to analyze, but too real and obvious to be unfelt. Taste is not to be guided or restrained by the rules of art; and in that innate principle, whatever it may be, which affords pleasure to the mind from the appearances of natural scenery, we perceive an adaptation to things as they actually exist, which reveals to us a paternal Creator. No person who, at this season, has, with an eye of taste, observed the accidental grouping of forms and tints in a forest of natural

ample share. Individual trees are often objects of great interest in their autumnal dress. It is not uncommon to see the sugar maple exhibit three distinct colors, yellow, scarlet, and green, at one and the same time, either mingled together, or in separate masses.

The brilliant hues now mentioned are over and above the endless variety of browns which mark the falling season in temperate climates. The display is too bright, perhaps, for the canvass to imitate, but to the lover and observer of Nature it is, while it lasts, a constant feast. Presently the brightness grows dim with the shortening days; a dull brown begins to prevail—prevails—the leaves drop; the pageant has passed away.—Am. Ed.]

wood, can refuse his assent to this sentiment, or can misunderstand the meaning implied in the observation, that none can paint like Nature. It is not merely in the harmony, the freshness, and the beauty of the coloring, that this is true, but in the contrasts, in the discrepancies, and even in the long breadths of tameness and uniformity which occasionally occur, as well as in the whole style of grouping, sometimes so wild, at other times so subdued, and again so full of unexpected grace and soft luxuriance. There is a peculiar charm in the very freedom and negligence of Nature ; and He who willed that this freedom and negligence should exist, beneficently implanted the feeling which should receive enjoyment from it. It might have been otherwise : and, what indeed is remarkable, it is otherwise in regard to works of art. There we expect an exact uniformity, or, at least, a studied adjustment, and we are pained when this is not to be found. Had such a sentiment been extended to natural objects, how much enjoyment would have been lost, how much discomfort would have been experienced.

THIRD WEEK—SUNDAY.

THE POWERS OF THE WORLD TO COME.

He is a forlorn child indeed, on whose lip the smile of playfulness is never seen, or whose eye never beams or sparkles with cheerfulness. There is a seed of hope and joy, which springs in the early portion of life, and indicates a longing after better things than are seen, and a capacity of maturer felicity than is tasted here. The buoyancy of youth indeed and its lively aspirations, sink often into the plodding dulness of riper years, and the animated youth becomes the tame and cheerless man.

This, however, is no argument against the truth that hopefulness and joy are strong ingredients in the human

character. Their failure is the fruit of misdirected energy, and efforts devoted to founding stable enjoyment on things that perish in the using. It is because man is capable of hope, that he experiences disappointment. It is because his nature is attuned to the elevation of joy, that he sinks in sadness.

The feeling mind must necessarily, in a world like this, have a tinge of melancholy shading its character, however strong its powers, and however energetic its exercises. This melancholy does not solely arise from the disjointed state of the world, or the fainting aspirations of the spirit. It relates often to a consciousness of futurity, involving indefinite periods, and incalculable capacities of sensation. The inbred conviction of an existence which shall endure when we have passed away from this world, has led the Californian to store up the remains of his departed kindred in sheds, facing the rising sun, that they may be ready to depart when the mysterious summons shall arrive. It has led the Indian to fix his gaze on the setting sun, to anticipate there his eternal home. This inbred conviction bowed the indomitable spirit of England's proud queen, when, in her death-pangs, she uttered the unanswered cry, "A nation of wealth for an hour of time!" This caused the daring and scorning philosopher, Voltaire, to tremble at the step he was about to make from things seen and temporal. This has been the source of all the superstitions of men of all casts of mind, and has raised up the spirits of the departed, and the "wraiths" of those about to depart. This has excited longings for "more evidence" of the existence of a world of spirits, though it should come in the form of flitting shades or sheeted ghosts.

Who is there so great in the might of philosophic power, or so absorbed in the pursuit of worldly gains or pleasures, or so sunk in unreflecting ignorance, as not to taste, in some degree, or at some period of his life, of "the powers of the world to come?" The hardy backwoodsman, who forces his way through hitherto unpenetrated forests, and finds the patriarchal oak smitten by lightning, knows that an Unseen Power is there. The ear that hears, with solemn awe, the rocks hurled to and

fro within the caves of ocean, by the heaving billow ; or, in milder mood, listens to the fall of waters, remote from human influence, and unaided by human skill, hears also a voice within his heart that tells him there is One whom he hath not seen, but whom he must one day see. The soul, however unenlightened, however confused in its apprehension, has a pulse beating for immortality, which throbs with solemn pauses, and warns him that there is a world to come, which even now lays fast hold on him.

It is a subject of curious speculation, whether it be possible, by a system of education, and a mode of treatment, entirely to extinguish, in any human breast, those solemn anticipations and mysterious conjectures which constitute a portion of humanity. The deadening effect of a life of pleasure has been depicted by moralists, and largely confessed by those who have been quickened and brought out of it. But the life of pleasure, even while it lasts, is bound up with hours of sadness, and experiences pauses, in which, reflection will force its way, and the voice of anticipation from the immortal spirit, will make itself be heard over the waste of vanity and levity. In hours of anguish, when human aid is unavailing, the spirit confesses that there is a Being far above, and too long out of sight, with whom is might and healing compassion.

Even the females of the East, enclosed in the gorgeous prisons which jealousy has assigned to them, and believing that they must look only to man as their deity, taught that the great duty of their existence is to adorn and accomplish themselves, that they may win his favor, and that their greatest transgressions consist in offending him,—even these, in their periods of Nature's sorrow, must have an inextinguishable conviction that man's help is vain. In the heart-burnings and miseries peculiar to their position, they must feel themselves capable of a higher enjoyment than what can flow from human approbation,—they must long to appeal to a tribunal more just than human justice. Prayer is the natural cry of distress. What is the poor excluded female to do? how to get vent for her woes? where to find an object for her hopes? Shut up though

she be, she has learnt that portion of the Moslem's faith, that there is one God. Is it possible, then, that even the infelicities of her portion can quench that spark of the divinity within, which prompts her to aspire after a purer state?

The question is asked in vain; for who shall answer it? Our female travellers, who have been admitted into the society of the harem, from Lady M. W. Montague downwards, have not been of a cast to search deeper than descriptions of dress, furniture, and manners. The time is yet to come, when some better spirit shall penetrate those realms of shade, and bring to light the idle superstitions, or the solemn apprehensions, which shall prove that the nature which God has made, cannot be quenched by his creatures, that his Spirit works in minds benighted in all outward means, and that the powers of the world to come are experienced even by those who are taught only the belief of a degraded immortality. M. G. L. D.

THIRD WEEK—MONDAY.

THE WOODS.—THEIR USES.

On the first sight of a large forest, a superficial observer may be inclined to ask, Why is all this waste of vegetable luxuriance? If this arrangement be indeed the work of an Intelligent Being, how comes it that He has been so laboriously busy in encumbering the earth with such a number and variety of useless trees? Would not a soil so fertile as to support these monstrous weeds, for they scarcely deserve a better name, have been more wisely and beneficently occupied with the production of less luxuriant but more profitable edible herbs; or, if there must be trees, why do they not bear fruits fit for human food?

In answer to this objection, I shall not at present recur to the view which has already been so frequently referred to in the course of this work, of the intention of the Creator that man should be saved from sinking into sloth and

insignificance by the necessity of labor, and should be stimulated to the cultivation of his mental and bodily powers, by rewards held out for his industry,—an intention which is evinced by the scope afforded for agricultural improvement, and which is incompatible with the arrangement that the objection supposes preferable. It will be my object rather to show that woods are by no means so barren and unprofitable as they are sometimes considered, but that, on the contrary, they form an important department in the economy of Nature.

Every part of a tree has its use. The leaves are not only necessary to the growth of the tree itself, as I have elsewhere shown, but, when shed in autumn, they cover the ground so as to protect the roots from the injurious effects of the winter's frosts: while, in their decay, they furnish a manure which adds to the fertility of the soil, otherwise liable to be exhausted by the demands of a gigantic vegetation. I have already spoken of their edible fruits, and I may mention, in a single word, that their seeds, by whatever other means they are protected, whether in the form of nuts or of berries, generally furnish nourishment to some species of living creatures, and thus, either directly or indirectly, not seldom contribute to the support or enjoyment of man.

If from the seeds of trees, we turn to the bark, we shall find that this also has its important uses. I have already considered the application of certain kinds of bark to the purposes of the tanner, but this is far from being the only use to which that part of a tree has been converted. Some species of foreign bark are aromatic, as that of the cinnamon tree; others are medicinal, as the Peruvian bark; and others, again, are capable of supplying the place of hemp in the manufacture of coarse stuffs and cordages; while, from an evergreen oak in Spain, we procure that useful material of which corks are manufactured. From the bark of trees, also, various gums and resins are extracted, of the former of which, gum-arabic, and of the latter, tar, may be considered as the most common and the most useful.

In the 'Spring' and 'Summer' volumes, I have already

adverted to the various advantages of trees, and, among other particulars, have shortly noticed the adaptation of timber to the important purposes of house and ship-building, as well as of the different kinds of machinery by which man facilitates his labors, both in agriculture and manufactures. As this subject, however, belongs more particularly to that part of my plan which I have reserved for autumn, I must again place it before the attention of my readers, and, instead of going over the same ground in my own words, I am happy to employ, in an abridged form, the eloquence of that excellent French writer of the last century, whom I have already quoted more than once.

"We may easily discover in the wide scenes of Nature, a number of bodies that are very massive and compact, such as stones and blocks of marble, which we can appropriate to a variety of uses. But these are very intractable, as well as brittle, and are only useful to us by continuing in a state of immobility; whereas the most enormous masses of wood are always obsequious to the will of man. Mighty growths of wood may, by the force of blows, be driven deep either in land or water, where they will form a forest of immovable piles, that are frequently incapable of corruption, and will for ever sustain the weight of the largest structures with such a firm cohesion and equality, as are not to be obtained even from the solidity of the earth itself.

"I likewise see vast bodies of timber disposed in a very different situation. They ascend to the tops of buildings, where they strengthen the walls, and prevent them from starting from the positions assigned them; they sustain the whole pressure of a huge roof of tiles or slates, or even lead itself.

"Is it at any time necessary for trees to be in motion for the service of mankind? you will then behold immense beams, which almost appear unmanageable, moving from their places, and adapting themselves to the full play of mechanic powers. They mount aloft, they descend, they roll, they whirl along, with as much agility as force, for the accommodation of man, and to aid the inability of his feeble arms. They supply us with all those vehicles which are

formed by the art of the wainwright, and with all those mighty engines which despatch more work in an instant, than could formerly be accomplished in many hours. Above all, we are indebted to the forest for those vessels that move upon the mighty waters, and resemble floating cities, which are wafted, with all their inhabitants, by the winds, from one end of the globe to the other.

"Man observed, that the animals around him were supplied with all that was necessary to their existence from the moment of their birth, and were enabled to transport themselves from place to place with surprising agility; while he himself was constrained to move, with a slow progress, in the painful pursuit of those accommodations that were dispersed at a great distance from him. He beheld other animals gliding as light as the wind, in the regions above him. He saw them cleave the air without the least impediment, and transport themselves from land to land, by a flight that was unobstructed by interposing seas. Man came into the world destitute of all these advantages, but he derived an ample equivalent from the faculty of reason, by which he compelled the terrestrial animals to direct their motions for his service. The levity of wood, the fluctuation of the waters, and the force of the winds, furnished him with expedients for procuring vehicles by land and sea, as useful as the wings of birds. When these inventions were completed, he no longer was limited to a scanty portion of earth, but was able to transfer himself wherever he pleased. A mutual intercourse was then maintained by distant provinces. The cities that were seated on the outlets of rivers, were furnished with importations from foreign lands, which they transmitted to different parts, and diffused through a whole kingdom. All the subjects of a mighty state seemed to be approximated by these means, and associated into one city. They soon became intimate. They contributed to the aid of each other, and frequent visits were interchanged between them. I may even affirm, that the whole earth is now become but one great town, of which the continents form the different quarters. Man, since the invention and improvement of navigation, can take a progress to each extremi-

ty of the world, in the same manner as the inhabitants of Venice pass from one quarter of their city to another, in their gondolas. By the aid of his vessels and sails, he arrives at those regions that have never been visited by the birds of his climate. When eagles and falcons attempt to expatiate as far as man, they turn faint, and are lost in the midst of their passage."*

It is more than a century since this passage was written. What would the author have said had he lived in our day, when the civilized world has advanced, and is advancing, with such rapid strides ; and when, by means of a new power, which was then unknown and unsuspected, man promises to rival the eagle and the falcon in the rapidity, as he has so long surpassed them in the extent, of his movements ?

THIRD WEEK—TUESDAY.

TIMBER.—ITS VARIOUS KINDS AND ADAPTATIONS.

THE vast variety which exists in the productions of the vegetable world has already been, more than once, noticed, and it exists no where more remarkably than in trees. That each variety has its specific use, and that its peculiar qualities were bestowed by the Creator for some express purposes, will not be doubted by any one who has learnt but a part of the lesson which these volumes are intended to teach. Of these purposes, some are still unknown, which, in the future progress of society, may be developed, and others may be chiefly confined to the lower creation ; but there are some which are so obvious in themselves, and which have so long been practically applied, that they cannot be mistaken. I have, in the preceding paper, adverted to the various ways in which, speaking generally, wood has been applied to use. At present, I shall show some of the properties of *particular* kinds, which have adapted them to the supply of human wants.

* Spectacle de la Nature, vol. ii.—Dialogue xvi.

Beginning with uncivilized life, I may remind the reader of what was said of the cocoa-nut tree in a former volume, the leaves, the trunk, the fruit, of which, nay, the very shell and envelope of the fruit, are all of such admirable utility to the savage, presenting themselves to him spontaneously, and obtruding their services, as it were, on his uninstructed mind. Of a similar kind is the bamboo, which is convertible into almost innumerable uses, and, as if intended for man in the earliest stages of society, as yet without knowledge or tools, it is ready wrought to his hands, symmetrical, and even ornamental, planed, turned, filleted, polished, varnished. It is convertible into a beam, a plank, a pillar, a mast, a yard, a floor, or fence, a house, a bridge, a pipe, a bottle, a cup, a kettle, a musical instrument, an aqueduct, a flower-pot, and even an article of food; while its wonderful profusion, and the rapidity of its growth, render it an inexhaustible resource for all these purposes. Its locality in tropical climates, where the excessive heat renders great exertion painful and injurious, is an additional mark of Creative benevolence which must not be overlooked.

The ratan is another tropical plant of great service to uncivilized man, as it furnishes him with a cord ready made for his use; and for string, he has not only the fibres of the cocoa, already mentioned, but those of the aloe, which are ordained to leave the plant of themselves, soliciting his hand. If he seeks for clothing, the paper mulberry and bread-fruit tree invite and reward his ingenuity; if for shelter from the rains, he can retire to the shade of the talipot tree; while, in the gomuti palm he discovers hair, and tinder, and oakum, all offering themselves to him unbidden, which are the more remarkable as they appear to be utterly purposeless to the economy of the plant.*

* [A few additional and explanatory notices of the trees mentioned in the above paragraph, may not be unacceptable. The paper mulberry, (*Broussonetia papyrifera*,) and the bread-fruit tree, (*Artocarpus*,) both furnish a kind of paper or cloth from their inner bark. A large proportion of the Chinese paper is manufactured from the former of these trees. The material furnished by the Artocarpus is of an inferior character, and

These are some of the provisions which may be regarded as the hornbook of man, teaching him simply, and in a manner adapted to his indolence and unnurtured capacity, the first rudiments of art, and thus leading him onward in search of higher attainments, by the exercise of deeper ingenuity, and more energetic exertion.

If we regard man in a more advanced state, we still perceive adaptations to his use in the natural productions of the forests not less remarkable.* The ash is formed with qualities which suit it, with most wonderful fitness, for the uses of carpenters. It splits easily, but its toughness and elasticity are very remarkable. It readily yields to the moulding power of the axe, the saw, and the plane; it does not warp; it is durable as well as strong; it possesses, in short, all the properties which a maker of agricultural machines and implements can require for the particular objects to which it is applied. Compare this with the beech, which may be wrought almost as if it were a block of stone, and thus supplies for machinery what the other uses of the ash render it incapable of performing. Its peculiar tenacity and structure are well appreciated by the millwright; and it is difficult to know where, in the whole forest, a substitute could be found for cogs and naves, so essential to machinery.†

In the fir-tribe, we discover other properties, which

from it is made the common cloths of the Polynesians.—The talipot tree is the *Corypha umbraculifera*, one of the palm family, which is described as having a trunk "as big and as tall as a ship's mast," and leaves of enormous size, some of which "are capacious enough to cover from fifteen or twenty to thirty or forty men," being fourteen feet broad, and eighteen feet long.—The gomuti palm is the *Gomutus* or *Aveng saccharifera*, the trunk of which is nearly covered with coarse black fibres, resembling horsehair. Besides supplying the articles above mentioned, it yields wine from its sap, and sago and sugar from its trunk. It is found in the islands of the Indian Archipelago.—Am. Ed.]

* These have already been adverted to in the 'Summer' volume, in the paper 'Trees used for other purposes than food,' but here I have entered into a minuter detail.

† [Though this may be true in England, it cannot be said of the beech of the United States, where the sugar-maple, white oak, and hickory are most commonly employed for the purposes of the millwright.—Am. Ed.]

render them extensively useful in other departments. To the house-carpenter, they are invaluable, as in all his operations, from the roof of the house to its doors, windows, and finishings, he finds its lightness, its softness, its strength, its durability, and its ready polish, every thing that he could desire. It wants, indeed, the great tenacity, flexibility, and elasticity of the ash; but these are qualities which would have diminished its usefulness for its peculiar purpose; so that both in what it possesses, and in that of which it is destitute, it demonstrates Creative wisdom and paternal intention.*

But the pine species are not less strikingly adapted to another purpose, bearing deeply on the moral and political condition of man,—I mean the masting of ships. Straightness, longitudinal tenacity, and levity, with a limited elasticity, added to a small flexibility, was the combination required; and we have seen that this is the very combination which exists. Here is a case, somewhat analogous, as Dr. Macculloch observes, to that of the feathers of birds. Nor is this analogy to be found merely in the exterior and obvious arrangement; since, in the interior anatomical structure, the contrivance is similar, and this structure is confined to the trees of that peculiar family. The strong and hard portion of the annular cylinder resembles the quill part of the feather, and the spongy lamina serves to extend the diameter of the total mass, without adding proportionally to the weight, thus producing the greatest transverse strength with the least quantity of materials, under the same mathematical principle. It is further remarkable, that this combination of properties should have been united to an erect simple form of great length; while we also perceive that a provision has been made for this, not only in the anatomical structure, but in a crowded growth, and in the decay of the lateral branches. Many other trees include one or more of these properties; but none unite the whole. The poplar is tall and straight, but it wastes itself in branches, and wants longitudinal tenacity. The lime

* [The wood most used in the United States for building purposes, is, as is well known, the white pine, *Pinus strobus*.—Am. Ed.]

possesses levity, but it is deficient in all else; and so with regard to all the other trees with which we are acquainted; all of them fail in some essential property. Is there not then a specific design in combining so many useful qualities in one tree—and that tree one of the most prolific and easily procured in temperate climates, and especially adapted to those localities where, on account of the high latitude, other vegetation becomes comparatively scanty?

For another purpose in ship-building, the oak is adapted with an intention not less obvious. In this tree, lateral and longitudinal strength are singularly united, and are combined with other wellknown qualities, which render it the special timber for ships. If straightness was required for the mast, a crooked growth was no less useful for the formation of the hull; and we find the oak more twisted and gnarled than almost any other tree, thus affording all necessary forms for the use of the ship-builder, united with a rigidity which precludes the danger of change of shape. There is but one other tree, the teak, which rivals the oak in fitness for the construction of ships; and it is worthy of notice, that the teak is allotted to hot climates, as the oak finds its native place in the temperate zone, the one ceasing to grow where the other commences.

There is yet another property of some kinds of wood with which I shall close this enumeration, namely, their almost endless durability when buried in moist earth; a property so opposite to others which vegetable substances possess, that it is altogether unexpected. It is, however, of the greatest utility; for without it, man could not have erected permanent structures on those wet and loose soils, which, from their peculiar fertility, are every where, and have ever been, the chosen seats of population; without this, we could but seldom have constructed highroads which cross rivers; without it, we could not have founded piers and made harbors; and without it, even Holland itself might still have been the bottom of the sea.*

* See Macculloch's Attributes of God, vol. iii.—'On the uses of vegetable substances to man.'

All these are important ends in the plans of Providence; and that man's skepticism must be incurable, who does not perceive and acknowledge that the means I have detailed were created for the express accomplishment of these ends. It would be easy to pursue this subject further, and to show more in detail the adaptation and contrivances in question; but a mere specimen is all that the nature of this work admits of.

THIRD WEEK—WEDNESDAY.

ORIGIN OF THE ARTS.

Considering autumn as the storing season, when the fruits of the earth are reaped and laid up for use, we are naturally led to look forward, and inquire to what particular purposes these fruits are to be applied. This presents to us a very wide field, in which the adaptation of the gifts bestowed by the Creator, to the wants of man, and the adaptation, also, of the human powers and faculties, to the appropriation and employment of these gifts, are wonderfully and most edifyingly displayed.

During the course of our investigations in the preceding volumes, we have seen an amazing diversity in the productions of Nature, and some of the ways in which these are made subservient to the subsistence and enjoyment of living beings, have been already pointed out. But there is one department which has as yet been but partially explored; I mean that in which human art has been called forth to prepare the raw material, so as to adapt it to the circumstances and desires of our rational and aspiring race. On this department I now intend to enter. It is full of interest, and will exhibit to us in a very remarkable light, that providential discipline, already so frequently alluded to, by which the powers of the human mind are stimulated, exercised, and improved, and society advances, step by step, in the progress of civilization.

There are three kinds of necessaries which man requires in every state of society, from the rudest stage of savage life, to that of the most polished and civilized community,—food, clothing, and shelter,—and none of these does he possess without the exercise of some labor and ingenuity. In the more genial climate, indeed, where he first arose from the hands of his Creator, and where his progeny, probably during the whole of the antediluvian ages, continued to reside, the two latter necessaries,—clothing and a prepared habitation,—might be dispensed with without absolutely endangering his existence; but yet they are of such essential importance to his comfort, that, next to food, they would undoubtedly be the earliest objects of his attention; and it is worthy of remark, that he might obtain them all without exerting greater skill and labor than a human being without culture may readily be supposed to bestow. His food would be found scattered around him in the fruits, roots, and esculent vegetables, which Nature spontaneously produces; a sufficient supply of such scanty habiliments as Nature demanded might be obtained in the simple form of woven leaves, of the inner bark of trees rudely prepared, and of the skins of dead animals dried in the sun; and for his place of residence he might resort to the shelter of the projecting rock, or natural cave, or, where he was unannoyed by the neighborhood of ferocious wild beasts, he might carelessly throw himself, during his hours of sleep, under the ready shade of some wide-spread tree.

I am not now writing the actual history of man, and am anxious the reader should understand, that I do not believe our original forefathers really emerged from this lowest state of barbarism; for I cannot doubt that, if there are tribes to be found in this degraded condition, it is because they have lost the vantage-ground on which they were at first placed by their Creator. Looking back to Noah, the second progenitor of the human family, we find him already in possession of many of the improvements of civilization, and prepared, with his family, to take advantage of the arts which his ancestors had handed down to him, for procuring not merely the neces-

saries, but the conveniences and comforts of life. I wish it to be understood, therefore, that I merely assume a position for the sake of illustrating an important principle.

When mankind have happened to be reduced to the low condition I have supposed, we have uniformly found that they have remained long stationary ; and, indeed, it is not very easy to see how, in the ordinary course of things, they should be readily emancipated from it.

It is true, that the country they peopled, however wide its boundaries, would at length become too narrow for the support of the inhabitants, and the misery of want, rendering them desperate, would rouse them from their natural indolence, and force them to exert their dormant faculties ; but the first and most obvious resource would be predatory incursions on their neighbors, which would do little more than add ferocity to their rude and brutal characters. From this lowest stage, therefore, I am not aware that the improvement of society ever proceeded as a natural result. In the history of all those nations, now advanced in the scale of society, which date their origin from a savage state, we find traditions, or historical notices, pointing to some particular era, whence their civilization took its rise ; and when this is the case, we uniformly hear of some remarkable individual, commonly a stranger from some distant land, who stood forth among them as their leader and enlightened benefactor, and on whom their unenlightened but grateful hearts have conferred the honors of divinity. Or, otherwise, some nation advanced in intelligence, has coerced them by force of arms, and while it bent their minds under the burden of a foreign yoke, presented them with the blessings of foreign civilization. Of the one case, we have an example in the gifts bestowed by the Minerva, the Mercury, and the Ceres of the ancients ; of the other, in the arts extended along with the conquering arms of Greece and Rome.

Such is the progress of actual history, but it suits our present purpose better to take the simple view of gradual developement, without very nicely inquiring into the means by which it has been accomplished. The savage has been excited by some stimulus, no matter what, and be-

gins to feel that he has wants ungratified, and is capable of exertions by which these wants may be supplied. He enters on a career of which no man has yet seen the termination. He desires to procure more abundant, more permanently secure, and more luxurious food, and he becomes a shepherd and an agriculturist; he has acquired a taste for variety and elegance in his clothing, and he becomes a manufacturer; he feels the comforts and conveniences of a well-constructed habitation, and architecture takes its place among the arts.

This career, though slow in its commencement and in its first stages, accelerates as it proceeds. Man is so constituted that success kindles hope and fires ambition; enjoyment, instead of producing content, excites new desires; exertion, instead of producing fatigue, only creates skill, and opens the way to additional labors. The motion, once commenced, is carried along by its own impetus, and always accumulating, proceeds in a constantly increasing ratio. The objects on which it expends itself are never exhausted. Nature is full of varied riches, and her treasury can never be emptied. In examining her resources, new materials are ever discovered, or new powers are developed, or new uses are invented. The faculties of man keep pace with the bounties of Nature; as her stores multiply, his ingenuity increases along with his desire of possessing; and thus a constant system of action and reaction is kept up, which is powerfully and irresistibly bearing society forward in its course of improvement. The present has been justly said to be the age of velocity, and to its excitement and progress there seems to be no assignable boundary.

Such is the effect produced by the correspondence of the external world, with the powers and faculties of the human mind; and so true it is, that the Creator has most wisely adjusted the one to the other, so as to cultivate the intellect, and give energy and success to the exertions of his rational creatures.

THIRD WEEK—THURSDAY.

HUMAN FOOD.—ITS PRINCIPLE.

I HAVE elsewhere adverted to the principle impressed on Nature by an intelligent and benevolent Creator, by which the necessity of laboring for the means of subsistence, is rendered a powerful and constantly-acting stimulus for calling forth and giving a salutary employment to the mental faculties of man ;* and I have also taken occasion incidentally, to show that an immense, and, practically speaking, an almost inexhaustible field for the increase of human food, in proportion to the demands of an increased population, is provided on the surface of our globe ;† but this latter subject is of such vast importance in an argument for displaying the Divine perfections, that it requires a more direct and formal discussion ; especially, as the true state of the case seems, in the present day, to be very generally misunderstood.

That the Creator could have formed man, without the necessity of sustaining his corporeal powers, by having recourse to food, no one can deny. His body might, doubtless, have been formed, had it so pleased the Divine Wisdom, of as permanent materials as pure gold or crystal rock, or even, with its present construction of flesh and blood, it might have found sufficient nourishment in the atmosphere he breathes. But this was not the scheme of creation, and would have been altogether inconsistent with the welfare of such a being as man, who requires to be roused and excited by some powerful necessity, before he will exercise his mental faculties. The whole process, as it actually exists, is exceedingly striking ; and indicates a deeply-contrived and most curiously-adjusted system, which it is impossible to contemplate in any one of its complicated bearings, without admiration ; and

* See 'Spring'—Origin of Agricultural Labor, &c. ; and 'Summer'—Principles of Horticulture, &c.

† 'Summer'—The Banana.—The Coral Insect, *et passim.*

which, considered as a whole, amazes and confounds the mind, while it unspeakably exalts its conceptions of the unseen Contriver.

The beautiful adjustment of the soil and the elements, to the nature of the seed and the growth of plants, and the reciprocal adjustment of the vegetable functions to inorganic nature; the fine and delicate adaptations of the whole system of organized existence, by which the almost innumerable productions of the vegetable world are so remarkably balanced among themselves, and adapted to their various localities, while they are with matchless wisdom formed so as to afford a grateful subsistence to the equally diversified tribes of living creatures; and especially the peculiar nature of these adaptations with reference to the human race, and the power bestowed upon the latter to modify their relations and regulate their growth,—all these circumstances, and many more, which have already been separately considered, unequivocally exhibit a system of intelligent, comprehensive, and far-seeing arrangement; and lead the mind to the contemplation of those ulterior views of the Supreme Governor, which have not yet been developed in the plan of Nature, but have been not obscurely intimated in the book of revealed truth.

With regard to that part of this wonderful system by which man is invested with the power of interfering with the nicely adjusted balance of Nature, and of subjecting both the vegetable and animal world to such alterations as may promote his own views, and enable him to advance the comfort, and make room for the multiplication of his own species, referring my readers to what has already been said as the occasion occurred, I shall, in the present and some subsequent papers, confine myself to one branch of this wide and most interesting subject,—that which relates to the question of supply and demand.

It has been alleged, by an exceedingly ingenious and well-intentioned writer,* that the supply of human food must necessarily be so disproportioned to the demand, as always to give rise to crime and misery, which are its na-

* Mr. Malthus.

tural checks, and that the tendency of the system is such as to induce the speedy arrival of a period in which the world shall become so overstocked as to prevent all further progression, and occasion evils at the bare suggestion of which human nature revolts. His argument is founded on the assumption, that the impulse to propagate the species is such, where there are no counteracting causes, as to occasion an increase of the human population in a geometrical progression, while their food is only made to increase in an arithmetical series ; that is to say, that there is no wisely regulated adjustment between the laws of multiplication and those of subsistence, but that these laws are contradictory and hostile to each other.

It may safely be affirmed, *a priori*, that there must be some fallacy here. Any one who has properly considered the analogy of Nature, will at once pronounce, that, in a system which, with regard to other particulars of inferior importance, displays so manifest and so benevolent an adjustment of the various departments of created things, a similar adjustment must be established in this higher department. Supposing, therefore, the natural fact to be established, that there is a tendency in the human species to increase in a geometrical ratio, we may rest assured, that the checks to this progression are such as to form a well-regulated balance, perfectly consistent with the welfare of society, and the intentions of Divine Goodness.

This conclusion is borne out by the facts of history, and a rational survey of the present condition and future prospects of the world. It is true that crime and misery prevail, and have always prevailed, in every state of the human race ; but this is the condition of our fallen nature, and depends altogether on a different principle from that which we are at present considering. At no period of the human history, and under no circumstances of their condition, were crime and misery the necessary result of over-population, or the necessary checks by which it was restrained. The Chinese have been accused of murdering their infants from this cause ; but what is the fact, even with regard to that thickly peopled and comparatively well-cultivated country ? Mr. Sadler has shown, on convinc-

ing evidence, that so far from China being yet made to yield its produce to the utmost extent, that country might be so cultivated as to "clothe and feed *five times as many human beings* as probably inhabit the whole world!" The ground on which he forms this remarkable conclusion, may be stated in very few words. He shows, from official documents, that China contains six hundred and forty millions of acres which might be cultivated, and that an acre of rice would afford a supply of that article sufficient for ten persons during a whole year, in the southern provinces, and for five persons in the northern. It follows, that rice, which is the natural food of the Chinese, might be increased, even by their present mode of cultivation, so as to maintain four or five thousand millions of people living as they do. If we make allowance for the quantity of land which would require to be occupied in raising the materials for clothing, the result will not be materially different, as an acre of cotton will clothe from two to three hundred persons. But the present population of China, does not, according to their own official documents, exceed three hundred and sixty millions, and is probably much less, while the population of the whole earth has never been stated at more than a thousand millions, and there is reason to believe it comes far short of that amount.*

If there be truth in this statement, it cannot be said that any necessity has yet existed, or is likely soon to exist, in China, for the perpetration of the unnatural crime of which they have been accused; and a similar remark may be extended to all the countries of the world. It is true that there has every where, and in all ages, been a pressure of the population against the means of subsist-

* Malte Brun states the amount at only six hundred and fifty millions, and the Supplement to the Edinburgh Encyclopedia, says, "we think his enumeration for Asia, Africa, and America still rather high, and submit the following estimate as the result of our inquiries :—

Europe, ...	185,000,000
Asia, with Australia and Polynesia,	270,000,000
Africa, ...	55,000,000
America, ...	40,000,000
	550,000,000

ence ; and it is also true that this is an ordination of the Creator, distinctly impressed on Nature, and interwoven with the system of his government. It is one of those wise provisions by which man is stimulated to exertion. But if it has given rise to crime and misery, this has never proceeded from any physical necessity, but simply from that defect in the moral character of man, which, in all his operations, is so painfully conspicuous.

THIRD WEEK—FRIDAY.

HUMAN FOOD.—THE MORAL OPERATION OF THE PRINCIPLE.

"It is an idea," says Mr. Malthus, "that will be found consistent, equally with the natural phenomena around us, with the various events of human life, and with the successive revelations of God to man, to suppose that the world is a mighty process for the creation and formation of mind. Many vessels will necessarily come out of this great furnace with wrong shapes. These will be broken or thrown aside as useless, while those vessels, whose forms are full of truth, grace, and loveliness, will be wafted into happier situations, nearer the presence of the mighty Maker."

This is a sentiment of equal truth and beauty ; and what the author applies to the final result, may not improperly be used to explain various circumstances and occurrences in the process itself. One striking instance appears in the case we are now considering. It is for the developement of mind, that the various arrangements as to human food have been made. For this purpose, man's existence was made to depend on a constant supply of organized substances convertible into articles of nutrition, and these were only afforded in such proportions as to require constant toil for their acquirement. This necessity became "the mother of invention," and has been rendered the means of calling into action those

mental faculties which would otherwise have remained in a great measure dormant.

But as it was not the intention that any thing in this sublunary state should be perfect, several evils have arisen from the system, though not necessarily inherent in it. One of these is the growth and nourishment of an intense selfishness. In the progress of society, a competition takes place. Every man labors for himself. His schemes, his toils, his hopes, and his fears, are centred in one great object, the acquirement, first, of the necessaries, then of the comforts, and then, again, of the luxuries and honors of life. There is, assuredly, in this employment a tendency to contract the mind and harden the heart. But there are many counteracting tendencies. Man is not an isolated being. He is a member of a family and of society. He is drawn out of himself by a thousand domestic and social ties. First, as a son, and afterwards as a husband and father, his benevolent affections are exercised. He mingles among friends and neighbors, and his social sympathies are awakened; the interests of his tribe or his country are at stake, and a principle of patriotism extends and exalts his views. As his intercourse enlarges, and his mind expands, he finds himself connected in various ways with distant countries, and he learns to feel an interest in all his fellow-creatures. The result of such discipline is that fine sentiment of the Roman poet,—"Homo sum; humani nihil a me alienum puto."*

In few minds, however, is an effect so salutary actually produced. It is not to be concealed, that the moral disorder of the human mind appears in nothing more strikingly, than in the perverseness with which it rejects what is ennobling in the discipline of Providence, and adopts sentiments and practices which tend to debasement. Oc-

* I am a man, and think nothing relating to man foreign to myself.—Terence Heaut., Act I. sect. 1, l. 25. [It is a fine sentiment, no doubt, in itself, but probably uttered in a sarcastic tone in the play, and at any rate uttered by a man who had ordered his wife to kill their daughter in infancy, and afterwards refers to this order with the greatest coolness, as a prudential arrangement; an incident revealing to us the low state of ancient morals.—Am. Ed.]

casionally we may find a Socrates, a Plato, or an Aristotle, a Cicero, a Seneca, or an Epictetus, breaking through the dark cloud in which society is naturally enveloped, soaring into a purer atmosphere, and expatiating in the light of Heaven. But these are rare instances,—exceptions which only confirm the general rule. Nothing can be more true or more important, than the conclusion which was forced on the wisest of these philosophers, that a revelation from heaven was necessary, to remove the ignorance and correct the evils which prevailed in the world.

Such a revelation has been vouchsafed to us; and in its whole spirit and tendency it is remarkable for nothing so much, as the manner in which it is framed for the counteraction of that selfishness, which is the besetting sin of our nature. Its leading principle is *love*. It represents the Eternal as a God of love, sending his beloved Son to save an apostate world. The character and offices of the Saviour Himself are peculiarly calculated to inculcate the same principle. He not only came with an errand of love, but his own heart was full and overflowing with the same sentiment. His life of voluntary humility and suffering, his death of ignominy and torture, were most heart-affecting indications of love; and these indications were heightened by every possible enhancement. The dignity and purity of *His* nature, the extreme degradation of *ours*, the immensity of his generous sacrifice, contrasted with the ingratitude and enmity of those for whom it was made,—all are so inexpressibly transcendent, that the mind is overwhelmed in the contemplation; and while we desire to know "the breadth, and length, and depth, and height" of this love, we are forced, with an apostle, to confess, that it "passeth knowledge."

For favors generously conferred, gratitude and affection are the natural return; and the effect of these labors of love, when duly appreciated, is to excite a corresponding feeling in the human heart. Not only, however, are our dispositions perverted, but our perception of Divine things is obtuse, and it is not till our understandings are illu-

minated by the light of Heaven, that the Divine blessings are "spiritually discerned." When that faith, which is "the evidence of things not seen," takes possession of the soul, the whole scheme stands revealed, and the Christian principle is implanted. We then come not merely to understand but to appreciate the dying injunction of Him by whose holy name we are called,—"A new commandment I give unto you, that ye love one another; as I have loved you, that ye also love one another."

With this sentiment in the heart, the whole operations of society acquire a new aspect, and seem regulated on a new principle. It is a remarkable part of the providential arrangement of human life, that every transaction has a bearing on the interests, not only of the individual, but of his fellows. No man can, by his lawful industry, benefit himself, without at the same time benefiting the community in which he dwells. His personal profit or enjoyment adds to the general stock, not merely because all communities are composed of individuals, but, in a still more extended sense, as contributing something to the welfare of others. The agriculturist tills his ground, and raises food not merely for himself, but for those who follow other occupations; he introduces improvements into his plan of operations, and these improvements not only bring a greater quantity of food into the market from his own farm, but are the means of advancing the whole agricultural wealth of the country, by giving rise to imitation and rivalry. A similar observation may be made regarding any other profession. The schoolmaster teaches; the manufacturer converts the raw material into clothing; the mechanic constructs machinery,—all not more for themselves than for others; and every improvement made in these arts advances the general welfare.

There is here a deep foundation laid for the operation of the benevolent principle; and although this principle, in all its fulness, may not be naturally felt, yet when once enlarged by the power of that "wisdom which cometh from above," it discovers a vast and constantly expanding field for its exercise. The labor is the same, but the

motive is purified and exalted. The Christian still, indeed, follows his lawful occupation, because he thus "provides for his own, and specially for those of his own house;" but with the pleasing consciousness dwelling on his mind, that he is at the same time advancing the prosperity, and contributing to the happiness of the community. He cherishes this benevolent sentiment in his heart. He modifies his operations, so as constantly to keep in view the beautiful arrangement of Providence, and to cause the current of his own business to coincide with the stream of Divine bounty. This motive ennobles his mind, and gives a higher character to all his operations. From being the mere selfish artificer of his own fortunes, he has become a generous benefactor of his species, "a fellow worker together with God."

THIRD WEEK—SATURDAY.

HUMAN FOOD.—ITS SUPPLY NOT INADEQUATE.

If the principle of the geometrical multiplication of the human race be not altogether false in theory, it has assuredly never been realized in actual experience. In looking at the actual condition of the world, in relation to food, at different periods of the human history, we do certainly find that the immense power of reproduction has always been an important element in the question; but it is far from having been the sole element. The whole complicated framework of society would require to be taken into consideration, before it could be possible to solve the problem. The habits and manners of the community; their modes of thinking; their moral condition, and intellectual pursuits; their ideas of comfort, and their views of happiness; all tend to modify the tendency to multiply the species, as well as the necessity of possessing the means of subsistence. There can be no doubt, indeed, that, in reference to all these circumstances, this necessity is a powerful, modifying, and constraining princi-

ple ; and that there is not one of them which would not be most materially affected, if that necessity did not exist. It might be curious, but would not be very profitable, to speculate on the probable state of human society, were the stimulus to exertion removed, which the demands of food constantly supply. It is, however, of greater importance to our present argument, to inquire to what extent it is true that the population actually exceeds the means of comfortable subsistence.

There are some curious speculations in the recent volume of Turner's 'Sacred History of the World,' from which I extract the following facts and reasonings, bearing directly on this subject.

"At this moment, in what has been deemed the declining years of our world, its powers of produce have been superior to its powers of popular multiplication. Our food exceeds, in its existing quantity, the present demand for it. We have more corn than we consume, and more is coming up than will be required by the present generation. On what is the urgency of some—of several—political economists, who uphold the Malthusian hypothesis,—to have our corn-laws abolished,—founded ? On the vegetable produce of the earth being as inadequate to the supply of the living numbers, as the opposition of the contrasted geometrical and arithmetical laws must have long since made it ? No ! They require the repeal of the restrictive regulations which keep foreign corn from our shores, on their perceiving and knowing that there is more corn in the earth,—now on hand, and certain to be produced,—than its inhabitants will need.

"Coinciding with this fact, of the mercantile solicitations for liberty of free importation, are also the circumstances which I will mention, from the periodical journals of the day, as the best practical authorities. The foreign dealers, in 1833, complained of the diminution of their trade, and of the value of corn, and of its fall in price, because there was no demand for it elsewhere, to take off the superfluous produce which had been accumulating among them. The countries of Europe had on hand so much more than their population wanted, that bad weath-

er was even deemed advantageous, from the hope that, by injuring the shooting vegetation, and preventing a good harvest, it would raise the prices of the stocks on sale. Because war had long ceased, there was no more that extraordinary consumption, which had made subsistence dearer; the superabundant productions of corn and wine, from their ordinary cultivation, were so much beyond the ordinary use of it, that the wine in 1834 was unsaleable, and the corn had become so cheap, that the landowners in Germany were much distressed. The German farmers sent abundance to foreign dealers; but other nations having enough of their own produce, it found so small a sale as to sink in its money-worth. The effect of our corn-laws, which prevented Prussia from sending its superfluity to market, is represented, in 1834, as causing its land to fall in price, and as destroying the agricultural trade of Poland, from its superabundance. So far was the population in Europe from overrunning its subsistence in 1834, that a great part of Poland was not in cultivation; and, of the land in actual husbandry, though only a third part was raised from it, which that portion could produce, yet even this was more than its own consumption required; so that their wheat was given to the cattle, because it had produced more than its people consumed.

"The same state of things, between population and produce, existed also in America in 1834, both in the United States and in the Canadas, though each was so surprisingly multiplying in their numbers, from emigration. Here, also, the demand was so much less than Nature's supply, that the price of it sunk too low to meet with the rate of wages, and to return a profit on the capital employed.

"This over-produce,—its exuberance beyond the consumption of the population,—was not in any one country, or in the most fertile regions, but equally so in the less favored ones; for we find Sweden, though so far in the north, and so near gelid Lapland, and so full of heaths, lakes, and mountains in herself, yet had so much more wheat than she wanted, as to be urging her government, in 1833, for leave to export it.

"From the produce most generally exceeding the demand of the population for it, all countries, in some years, and most countries at all times, are enabled and desirous to export their superabundance, even though some of their provinces receive a partial importation. This has been the case in our own country. Parliament, at the Revolution in 1688, enacted a bounty on exportation, when wheat was at 48s. a quarter, or below; and for fifty-five years, England was an exporting country. In the next fifty-five years, the bounty was sometimes discontinued, and sometimes renewed. Importation was at times allowed, and at others prohibited; but always amounting to a very small part of our actual consumption. At present, notwithstanding our surprising increase of population, we are actually raising more than our numbers use.

"Flanders produces so much, from a soil not distinguished for its natural fertility, that although crowded with inhabitants more densely than perhaps any other country, yet it exports, every year, one-third of its harvest. The produce, as compared with the population, even doubles the amount of ours.

"France is also, in some degree, an exporting country, although its consumption of bread is supposed to be greater than ours; and though it occasionally imports, as harvests fluctuate, yet its exports, in 1834, far exceeded its imports."*

From these and various other facts which he details, and the truth of which he substantiates by quotations from various sources in his foot-notes, Mr. Turner concludes, that so far from the population outrunning the supply, there is, in fact, at this moment, notwithstanding the rapid increase of the former, a superabundant produce in actual existence over the whole face of the civilized world; that although particular districts may be deficient, and although, in some years, the harvests may fail in various parts, there is always found to be enough to supply the want as it arises, by importation from those quarters where the necessaries of life are superabundant; and that, therefore,

* Turner's Sacred History, vol. iii. Letter 29.

the idea of Mr. Malthus, that the population outgrows its subsistence, is "an unfounded fancy."

This conclusion seems, at first sight, to be inconsistent with the known fact, that there are vast numbers of the human race, in very many regions of the world, who are destitute of the common necessaries of life; but when the matter is properly understood, it will be found to involve a very different question from that of vegetable nature not producing what the populations of the earth require. "It is not," as our author justly observes, "because there is not a sufficient quantity of the alimentary articles on the earth, that any are in want; it is because they have not the means of purchasing or obtaining what they require, from those who possess. If they had the trading medium, they would find in the public markets, every where, the sufficiency they desire." Poverty and want, he therefore argues, are the topics of an individual question between man and man, or between each person and society, and not between mankind and Providence. This is true, in so far as relates to the present subject; but yet the inequality alluded to, is a question of great importance, in reference to the providential system of our globe, and on this subject I must refer the reader to the observations made in another volume, when considering the origin and effects of property in the soil.*

FOURTH WEEK—SUNDAY.

CHRISTIANS "MEMBERS ONE OF ANOTHER."

THE striking parable by which a Roman statesman, Menenius Agrippa, composed the minds of his fellow citizens, and brought them back to reason, at a time when they were raising a formidable rebellion against their rulers,

* 'Spring.' Eighth Week—Tuesday, Wednesday, and Thursday.

was founded on the union and mutual dependence of the different members of the human body ; and the very same image is more than once made use of by the Apostle Paul, to enforce the reasonableness, the duty, and the necessity of mutual sympathy and good offices among Christians. The Apostle, however, takes much higher ground, and, by the aid of Revelation, is enabled to give a more noble and important character to his argument. He represents Christ as our head, and believers as members of His spiritual body. Nothing can more emphatically express the entire dependence of Christians on their Divine Master. The head is the seat of thought, and the chief residence of the senses. Without it, we cannot live for a single moment ; and, if we could, all the enjoyments of life would be gone. There would be neither smell, nor taste, nor hearing, nor sight ; neither discernment nor knowledge ; nothing would remain but a mere animal, or rather vegetable, existence, without intelligence and without pleasure. In a similar manner, Christ, as our Spiritual Head, is the source of life and happiness. Without Him, we should be dead to spiritual sense, spiritual discernment, and spiritual knowledge. We might live, indeed —alas ! how many live without Christ !—but the light of life would be wanting ; there would be darkness and insensibility,—low and grovelling views and desires ;—all that is most noble and excellent in the soul would be dead.

Indeed, in representing Christ as our head, a figure is used, which, more strikingly and more comprehensively than any other, exhibits Him as the Author of all spiritual blessings. Other comparisons intimate that particular gifts and graces are derived from Him ; but this includes them all. Thus, when He is said to be the foundation on which the church is built, our dependence on Him is intimated ; when He is described as a vine, of which his disciples are the branches, we are reminded of the vital influences which He communicates. In like manner, when He is compared to food, of which it is necessary to eat, that our life may be sustained ; to raiment, which we must put on, that we may be clothed ; to the sun, by

which we are enlightened ; to the shadow of a great rock, under which the traveller finds rest and refreshment ;—these figures intimate the nourishment, the comfort, the light, and the peace, which He communicates to those who receive Him. But all these blessings are at once represented by the union of the head with the members.

There is, however, another point of view, in which this intimate and endearing relation is exhibited to us in the New Testament, which is not less striking and important ;—and I mean that which suggests to us, not only the duties owing by the members to the head, but also the ties by which each member is connected with all the rest. It is on this latter subject, that I am at present desirous to fix the attention of my readers.

"As we have many members in one body," says the apostle already alluded to, "and all members have not the same office : so we, being many, are one body in Christ, and every one members one of another."* From this analogy, the inspired writer shows the fitness of each individual exercising the peculiar gifts bestowed upon him, so as to promote the interests of the whole. They are, for wise purposes, made to differ ; and, just as it would not be for the good of the human body, that it should only consist of one kind of member,—that it should, for instance, be all eye, or all ear, or that it should only possess the feet for walking, and not also the hand for labor, and the mouth for nourishment,—so it would not contribute to the perfection or usefulness of the spiritual body, that all the members of which it is composed, should only be endowed with one kind of gift, however important.†

But the argument goes further, and alludes to a remarkable peculiarity in the Divine administration, by which certain graces and endowments are bestowed much more abundantly on some individuals than on others. It is natural to wish that all should be perfect in the virtues and acquirements which belong to the Christian character, or to the particular stations which they occupy, and the va-

* Romans xii. 4, 5.

† See this argument strikingly stated in the twelfth chapter of the First Epistle to the Corinthians.

rious offices which they fill ; and doubtless it is our duty to aspire after this perfection. But, whatever may be the case in the world of spirits, it is not intended that the attainment should be actually made in our present imperfect state. It is of importance, therefore, that, while we omit no means which may be within our reach, of rising "to the full stature of perfect men in Christ Jesus," we be peculiarly assiduous in cultivating the particular talent committed to our charge. This the Apostle intimates, when, speaking of the ministers of the Gospel, he says, "Having, then, gifts differing according to the grace that is given to us ; whether prophecy, let us prophesy according to the proportion of faith ; or ministry, let us wait on our ministering ; or he that teacheth, on teaching ; or he that exhorteth, on exhortation ; he that giveth, let him do it with simplicity ; he that ruleth, with diligence ; he that showeth mercy, with cheerfulness." We are bound to regard any peculiar quality or attainment we may possess, as bestowed upon us for the express purpose of enabling us to exercise a particular department in the body of which we are members ; and, just as the very form, position, and mechanism of the hand or the foot point out its peculiar office in the human frame, so the characteristic constitution of our mind, and the special powers which it possesses, as well as the station and relations in which it has pleased Providence to place us, ought to be regarded by us as distinct indications of the peculiar duties which He requires us to perform. While we "covet earnestly the best gifts," we must not neglect to cultivate the "gift which is in us."

In the performance of these duties, we should ever keep in mind the peculiar relation in which we stand to each other, as members of the same body. It is a most intimate relation, and must, if properly appreciated, lead to the kindliest union and sympathy. "No man," says the Scripture, "ever yet hated his own flesh, but nourisheth and cherisheth it." If we were but to realize to our minds the sentiments and obligations which this analogy implies, a most important progress would at once be made in that principle of Christian love, which is declared to be the "end of the commandment," and "the bond of

perfectness." "The eye cannot say unto the hand, I have no need of thee: nor again the head to the feet, I have no need of you. Nay, much more those members of the body, which seem to be more feeble, are necessary: and those members of the body, which we think to be less honorable, upon those we bestow more abundant honor; and our uncomely parts have more abundant comeliness. For our comely parts have no need: but God hath tempered the body together, having given more abundant honor to that part which lacked: that there should be no schism in the body; but that the members should have the same care one for another. And whether one member suffer, all the members suffer with it; or one member be honored, all the members rejoice with it."

There are some very weighty considerations involved in this beautiful figure, as followed out by the inspired author. If we apply it to the various ranks of society, they are all placed on an equal footing as regards the obligation of Christian love. To the one, indeed, is assigned a more extensive and more important sphere of duty than the other: but the king and the beggar are but different members of the same body, and are therefore united together by a band which places them in the same relation to their Spiritual Head, and on the same terms as regards each other. If we apply it to diversity of talents and endowments, the wise and the simple, the learned and the ignorant, the uncivilized and those who are surrounded with all the lights of knowledge and of science, have no reason either to presume or be discouraged on account of these differences. It may be said of them, as of those who occupy different stations in society, they are but different members of the same body; and as, in the sight of their Divine head, they are only strong or feeble, honorable or dishonorable, in proportion to the manner in which they fulfil the office assigned to them, whatever that may be, in the very same light ought they to be regarded by their fellow members.

This view brings us to a proper understanding of the relation in which Christians stand towards each other, and annihilates all those worldly distinctions by which

mankind are separated from each other in society. It is necessary that these distinctions should exist. Such is the wise decree of Providence ; but it is not necessary—it is altogether improper—that they should mutually alienate fellow Christians. In the presence of our Great Head, every earthly distinction should be laid aside ; and we should meet in his temple below, standing on the same level, with regard to one another, which we are destined to occupy in his temple above.

FOURTH WEEK—MONDAY.

HUMAN FOOD.—PROVISION FOR THE FUTURE—SOIL STILL UNCULTIVATED.

We have seen that, during the four thousand years in which the human race has been in progress, it has not yet reached its maximum of population, with reference to the supply of the necessaries of life, and that although, through the whole course of that long period, they have been always increasing and always pressing upon the means of subsistence, these means have constantly yielded to the pressure, so that the increase has never exhausted the supply ; and this remarkable fact is itself sufficient to afford a reasonable conviction, that the same balance which has hitherto been maintained, will continue to the end of time. It is a law obviously impressed on nature, by the Infinite Intelligence which called it into existence ; and we may rest assured, that the benevolence which formed the law will not cease to adjust its operation. We may, therefore, safely arrive at the conclusion, previous to all experience and to all reasoning on the facts of the case, that any theory must be false which maintains that this arrangement contains in itself the seeds of its own destruction. But it will be more satisfactory to show, from an induction of particulars, that, so far from the productive powers of Nature, with regard to human food, being nearly exhausted, there is still a field of vast extent which re-

mains to be cultivated, and which, taking the power of agricultural improvement as it at present exists, admits of the increase of population for many centuries, even at its recent accelerated progress, without any danger of the demand exceeding the supply.

It is necessary for an increasing population, that there should exist either additional soil to cultivate, or a power of producing additional means of subsistence from the same soil, or both of these requisites conjoined. Let us first examine how the case stands in regard to soil. Is there territorial surface at present on the earth, unemployed, on which an additional population may exert its productive energy ? The answer to this question is highly satisfactory.

The present population of our earth has been variously estimated at from five hundred and fifty to a thousand millions. Taking the average medium between these two extremes, we may safely consider the whole amount of the human race now existing on our globe, to be between seven and eight hundred millions. It has progressively risen to this number ; and, looking at all history, it cannot be doubted that the earth never contained so great an amount of the human race as it does at this moment. Within the last hundred years, indeed, causes have been operating, and becoming constantly more powerful, which were never before combined, and which all seem to be peculiarly favorable to the continued and rapid multiplication of our species.

Let us consider, then, what proportion of soil on the surface of our earth, would be sufficient to nourish this number of human beings, if cultivated according to the agricultural skill at present exercised in Great Britain. Mr. Turner has the following calculation :—" Our two islands of Great Britain and Ireland, contain twenty-four millions of human beings. Multiply this by thirty, and we have seven hundred and twenty ; therefore, thirty times as much space of soil as Great Britain and Ireland comprehend, would be sufficient for the maintenance of seven hundred and twenty millions of human beings, living as our fellow-countrymen generally do. Now, these

islands comprise an area, altogether, of a hundred and eighteen thousand four hundred and sixty miles.* This space, multiplied by thirty, will amount to three millions five hundred and fifty-three thousand eight hundred square miles. Thus, for the comfortable support of seven hundred and twenty millions of the human race, like the inhabitants of our own country, no more than about three millions and a half of square miles of surface would be requisite. Now, in the four quarters of the globe, the whole of actual land surface which is presented to us, has been stated to be a little more than fifty-one millions of square miles, though some suppose it may be a little more ; but, on either computation, we see that one-sixteenth or seventeenth part of our present dry land would be quite enough of cultivable ground to nourish, at one time, the greatest amount of human population which has hitherto been permitted to be, contemporaneously, upon the earth."†

I stated in a former paper, that the kingdom of China alone might be cultivated to such extent as to support five times more inhabitants than the world at present contains. By another calculation, Mr. Turner has shown that, according to its present state of cultivation, defective as it is, twice its superficial area, or about two millions and a half of square miles, would maintain all the present inhabitants of the earth. But this would be only one-twentieth part of our present dry land. Thus one-sixteenth only of what is dry land, would be sufficient for all our existing population, living as our fellow countrymen do ; or one-twentieth, living like the Chinese, under their respective soils and climates, and with that degree of cultivation which each country at present receives.

But a far less proportion of surface would suffice, under a more extended cultivation. The following calculation is made in a philosophical work of merit :—" The United Kingdom contains 74,000,000 of acres, of which

* England and Wales contain 57,960 square miles ; Scotland, 30,500 ; and Ireland, 30,000 ; in all, 118,460 square miles.—*Murray's Encyclopedia Geog.* pp. 312—475.

† Sacred History, vol. iii. p. 401.

64,000,000 are susceptible of cultivation. Half an acre, with ordinary attention, yields corn enough for one individual, and one acre will feed a horse ;* hence the United Kingdom could maintain 120,000,000 of people, and also 4,000,000 of horses."† By this statement, the whole present inhabitants of the earth might be supported on an area only between five and six times larger than that of Great Britain and Ireland.

There is, then, a very large proportion of our cultivable land still unoccupied. This, of course, results from the wise prospective arrangements of Providence. The plan adapted by Divine Wisdom is that of the progressive improvement and developement of the human species. According to this plan, a wide space was required to be left for future occupation, in proportion as our race shall improve and increase. Four thousand years have passed away, in which the system has existed. It has fulfilled, and is fulfilling, the purposes of its Creator. The scheme is still in progress. Improvement is proceeding in an accelerated ratio, and population keeps pace with improvement. Notwithstanding there has been a constant demand for more food, which has always been met by a new creation of supply, the means of subsistence are unexhausted, and, for several ages, inexhaustible.

Let us look, however, a little more minutely at the practical state of the question. For the last century, England has been making an unexampled progress in civilization, which has been accompanied with an equally remarkable progression in its population. Leaving out of the question America,‡ and other countries similarly

* This is independent of grass.

† Edinburgh New Philosophical Journal, September, 1828.

‡ Mr. Malthus, founding on the rate of increase in America, assumes, that the population will, under favorable circumstances, double itself every fifteen years ; and Bishop Summer, whom I have quoted in the 'Spring' volume, in considering the origin of agricultural labor, adopts his premises. Mr. Sadler, however, has made a formidable attack on Mr. Malthus's principles, and, among other things, has shown that he made much too little allowance for the effects of emigration. At all events, the practical question is rather to be taken from the experience of an old than a new country. The possibility of a population doubling

situated, in which the inhabitants receive rapid increase by emigration, England may be taken as an example of the most favorable state of society for the advancement of its numbers, which is likely to occur.* It is now increasing its population at the rate of about one and a half per cent. yearly; and, within the last seventy years, the amount of inhabitants has been doubled. Assuming, therefore, this as the ratio of future increase over the whole surface of the globe, which is a liberal ground of estimate, and assuming, at the same time, that the whole improveable soil is eighteen times the quantity at present cultivated, it would require at least three centuries to people the whole globe, so as to exhaust the food capable of being raised at the rate of the present average produce of Great Britain. This, however, is but one element in the calculation; and we shall soon see that the Creator has bestowed other resources on Nature, which must throw such a consummation to a far greater, but, with our present data, an indefinable distance.

FOURTH WEEK—TUESDAY.

HUMAN FOOD.—PROVISION FOR THE FUTURE—IMPROVED CULTIVATION.

THE extent to which improvement may be carried in the art of agriculture it is not easy to estimate; but that

itself once in twenty-five, in fifteen, or even in ten years, may be true, and yet the natural and moral checks may be such as to render this possibility nothing better, practically considered, than a mere useless speculation.

* England is probably the most favorable example of increase in the population of any country of modern Europe. Scotland has increased in the same period so as to double its population only in one hundred and twenty years. Ireland, in 1791, had doubled its population during the preceding seventy-nine years. France, at its present rate of increase, would, according to Mr. Malthus, require one hundred and eleven years to double its population. If, indeed, the rate be taken from the experience of the last thirty years, it would take no fewer than two hundred years for a duplication.

it may be very great, no one can doubt who is acquainted with the history of society, and the present state of practical science. The progress which has hitherto been made in cultivation, has resulted chiefly from the experience acquired by unscientific men. The labors of the farmer have generally been carried on by persons in an inferior rank of life; or, at all events, by those whose minds were not turned to such objects as might enable them to conduct their plans on extended and enlightened views of the powers of Nature. The real value of agricultural improvement has, however, been, within the last half century, better understood, and men have begun to direct their attention more energetically to the investigation of its principles, and to the improvement of its operations. That much advantage may be derived from such a source may well be believed, both when we consider what science has effected for the other arts, and when we look at what it has already accomplished for agriculture itself. The prodigious advances which have been made in manufactures, by the genius of a Watt and an Arkwright, afford evidence of what may be effected in other departments, and rebuke the presumption of those who would set bounds to improvement. In the cultivation of the soil, the scientific labors of Sir Humphrey Davy, and the example he has set of the successful application of chemical knowledge to this useful art, is, in itself, an important step, which, in its future consequences, stretches far beyond the discoveries he has actually made, and opens an extensive and fertile field, hitherto but little explored. Who shall venture to say to what results such a direction of talent may eventually lead? We have acquired a more accurate analysis of the constituents of soil, and of the plants which it nourishes. Something is still wanted for the practical application of this knowledge; but it will not be thought chimerical to conjecture that we may be on the verge of some discovery which shall alter the whole system of agriculture, and give a new and incalculable force to the powers of vegetation.

The precise nature of the process, by which the simple elements derived from the soil are decomposed, and con-

verted into the proper juices of plants in their leaves, is still unknown; but that it is a strictly chemical elaboration is highly probable: and that it may be imitated by artificial combinations, notwithstanding the power essential to it, of the living principle, at present so mysterious, seems at least to be possible. "We have not yet discovered," says Mr. Turner, "the art of converting azote, carbon, oxygen, and hydrogen, lime, or clay, or silex into nutritive matter. The vegetable principle, universally, has the power of effecting this, by its diversified organization, into its own compounded substance; and this, so made, becomes our food. Whether mankind, who now, by Mr. Crosse's experiments, have attained the power of crystallizing matter into gems, and of reviving insects or *infusoria* by the aerial electricity, will acquire the knowledge how to imitate the vegetable process; and, like this, to put the material particles of our surface into an alimentary condition for our use, no one now living can either affirm or deny. It is not more unlikely, than the galvanic metallization of the earths and alkalis, or the crystallizations of Mr. Crosse, before the last year, 1836."*

* Sacred History of the World, vol. iii. Letter 30. The experiments by which Mr. Crosse seems to have produced insects from silex, have justly attracted the attention of the philosophical world. It is no wonder that his facts, whilst they cannot be doubted, should have excited the desire to explain them away, they are so new in themselves, and seem so directly to imply the exploded doctrine of equivocal generation. It appears, as yet, too soon to pronounce dogmatically on this interesting subject. The account which Mr. Crosse himself has given of their appearance, is very singular. It is in substance as follows:—"To a portion of the silicate of potassa, formed by a process which he has described, boiling water was added, to dilute it, and then, slowly to supersaturation, hydrochloric acid. This fluid was subjected to a long-continued electric action, through the intervention of a porous stone, in order that, if possible, crystals of silica might be formed at one of the poles of the battery; but Mr. Crosse failed in accomplishing this by these means. On the fourteenth morning from the commencement of the experiment, were observed, through a lens, a few small whitish excrescences or nipples, projecting from about the middle of the electrified stone, and nearly under the dropping of the fluid above. On the eighteenth day these projections were enlarged, and seven or eight filaments, each of them larger than the excrescence from which it grew, made their appearance on each of

If, from chemistry, we turn to natural philosophy, we need not despair of seeing this department of science made subservient to the same important object. It is known, for example, that the electric fluid, that mysterious but

the nipples. On the twenty-second day these appearances were more elevated and distinct, and on the twenty-sixth day each figure assumed the form of a perfect insect standing erect on a few bristles which formed its tail. Until this period, Mr. Crosse had no notion that these appearances were any other than an incipient mineral formation, but it was not until the twenty-eighth day, when he plainly perceived the little creatures move their legs, that he felt any surprise; and when this occurred, as may easily be imagined, he was not a little astonished. Mr. Crosse endeavored to detach, with the point of a needle, one or two of them from their position on the stone, but they immediately died, and he was obliged to wait patiently for a few days longer, when they separated themselves from the stone, and moved about at pleasure, although they had been, for some time after their birth, apparently averse to motion. In the course of a few weeks, about a hundred of them made their appearance on the stone. At first each of them fixed itself for a considerable time in one spot, appearing to feed by suction, but when a ray of light from the sun was directed upon it, it seemed disturbed, and removed itself to the shaded part of the stone. Out of about a hundred insects, not above five or six were born on the south side of the stone. On being examined with a microscope, the smaller ones appeared to have only six legs, but the larger ones eight. Mr. Crosse states, that 'it would be superfluous to attempt a description of these insects, when so able a one has been transmitted from Paris. It seems they are of the genus *acarus*, but of a species not hitherto observed.' They have been seen and examined by many scientific men and eminent physiologists, who all coincide with the opinion of M. Turpin, and the members of the Academie des Sciences, as to their genus and species." Mr. Crosse himself has never ventured to give an opinion as to the cause of the production of these extraordinary animalcules, but the general opinion is, that the phenomenon may be accounted for without departing from the received opinion respecting animal generation. "It is monstrous," says Mr. Murray, "to suppose that any physical power known to man, whether electricity or any other, could not only build up a curious and complicated structure, but infuse into its mechanism the *vis vitæ*." "The sum of the whole matter, as far as Mr. Crosse's experiments are concerned, is simply this—the ova of the acarus derived from some of the sources mentioned are hatched by the electricity of the galvanic battery." "It ought never to be forgotten, in our estimate of these phenomena, that similar organized beings invariably make their appearance under similar circumstances—such as the eels in paste, and the fork-tailed eels in vinegar—infusions of pepper, hay, &c., 'each after its kind.' This is also shown in specimens of water obtained from various sources, and seen in the solar, or in the oxy-hydrogen microscope."—*Murray on the Vital Principle.*

universal agent, is intimately connected with the vegetable process. Will it be supposed incredible, that the astonishing investigations which are at present in progress, with the assistance of this principle, may lead to some great revolution in the cultivation of the soil? It has been already proposed, by means of thunder-rods, to collect the electric fluid, and distribute it over the soil; and although this scheme may fail, it would be rash to aver that some other mode of adding fertility to vegetation, by the application of this agent, may not be found effectual.

Again, if we attend to mechanical contrivances, we shall here find a new opening for agricultural improvement. The instruments employed in tilling the soil, and in other departments of the farmer's employment, are confessedly imperfect. Improvements have of late been proceeding in an accelerated ratio, which, while they show the defects of former implements, afford the promise of still further advances. That there is room for such advances, there can be no doubt. Compare, for example, the husbandry of the plough with that of the spade. The former is more speedy, the latter more effectual; so that what is gained in the one case, is, at least to a certain extent, lost in the other. An instrument is therefore still a desideratum that shall combine the speed of the one with the efficiency of the other. A similar observation may be made with regard to other farming implements. What the power of mechanism may effect, is partly seen in the invention of the threshing-machine. The application of the steam-engine to the purposes of agriculture is a probable method by which this department of the arts may again be advantageously employed to bestow additional power on the cultivator of the soil, and increase the quantity of human food.* "There is such a spirit of enterprise and

* Lord Henniker stated, at the Suffolk agricultural dinner on 8th September, 1836, that in Lincolnshire they had already a steam-plough, which could harrow thirty, and plough eight, acres in a day. The author witnessed the operation of this steam-plough, (Mr. Heathcoat's,) exhibited at the meeting of the Highland Society, in Dumfries, in October, 1837. Its work on a large area of moss land, through which the Lochar flows, was very surprising: but much improvement must be effected before it can prove practically useful. The expense alone is

intelligent ingenuity among our countrymen," says Mr. Turner, truly, "that we may expect that all improvements which can be invented and brought to bear usefully on this point, will in time occur, as our population enlarges, because that increase will bring more acting minds into existence, and stimulate their activity."

These views are thrown out, not with any other intention than that of addressing an argument to our ignorance. I speak of possibilities, not certainties, nor even, perhaps, probabilities, in some of the instances mentioned; and the inference I would draw, is this,—that the boundaries of agricultural improvement are far from being capable of distinct definition, and may be placed at a distance far more remote than our present knowledge can warrant us to assign. From past experience, we have reason to conclude, that the field will gradually open, as the necessities of man require. Such is the undeviating system; and as this system is not the result of chance, but the appointment of an infinitely intelligent and all-powerful Mind, we may rest assured, that it will continue to fulfil its high destination to the very last. The power of producing additional food, by whatever means it may be acquired, will undoubtedly prove coextensive with the increasing propagation of our species. Both shall have an end,—so the Divine oracles declare,—but they will end together.

On the preceding conjectures, however, I am far from resting the case. There are, at present, powers at work, and materials in existence, which sufficiently indicate a vast future accession of the means of subsistence, and prove the beneficent intentions, and the wise arrangements, of Providence. To these, I shall advert in the next paper.

Meanwhile, I conclude at present with the following pi-

sufficient to prevent its employment; and it is only fit to be used on such a locality as the Lochar Moss. The saving of food in the article of horses alone, would be immense were this experiment to succeed. It is calculated by Mr. Brown, in the New Farmer's Journal, (1st November, 1833,) that the horses now used in husbandry alone are maintained at a yearly expenditure of *thirty millions*. This expenditure is, of course, chiefly in food. Each horse is said by him to require eight times the soil and substance which would supply food for a man.

ous observations of the well-informed writer, whom, on this part of my subject, I chiefly consult, and whose spirit I would gladly infuse into my own pages :—" Let us repose calmly on the fact, that society has hitherto been supplied, regularly, from the natural system of things, with the food it has required. We have, in this advanced period of the world, enough for our present wants ; and all the providing causes from which this sufficiency has resulted to us, are still in their efficacious operation, and discover no sign of diminution, of general failure, or of distressing insufficiency. The same benevolent plan, and all its associated purposes, are in steady execution ; and the true principle of our trust and hope, has been delivered to us from the highest authority. ' Your heavenly Father knoweth that you have need of all these things.' As long as He means us to exist on earth, Nature will be made to yield the surplus which that existence will require. He must be expunged from his creation, before the result can be otherwise."*

FOURTH WEEK—WEDNESDAY.

HUMAN FOOD.—PROVISION FOR THE FUTURE—MEANS NOW IN EXISTENCE.

In a former paper, the conclusion has been drawn, that, were the inhabitants of the earth to increase, at the rate which has been experienced in England for the last century, supposing agricultural skill meanwhile to be stationary, it would be, at least, three centuries before the whole improvable land on our globe could be fully occupied. This supposition, however, is far more unfavorable than existing facts seem to warrant ; and many reasons might be advanced to prove, that, events continuing to proceed as they have hitherto done, it would require an immensely longer period, before the soil capable of raising human

* Sacred History of the World, vol. iii. Letter 30.

subsistence would be exhausted. Taking for granted, however, that the calculations already made are just, and descending from conjecture and speculation to existing facts, let us see if there are not in the powers of Nature with which we are acquainted, indications of a provision for the existence of a far more numerous population, than would result from the mere cultivation of an additional extent of surface.

I have, in the 'Summer' volume, instanced the banana tree, as a vegetable product, which might be cultivated to such an extent, as to increase, in a very extraordinary degree, the amount of human food. It is said, by Humboldt, to be capable of supporting twenty-five individuals, on a patch of ground, which, if sown in wheat, would only support a single person. It is propagated with the utmost ease; it is a native of every tropical region; and flourishes freely, wherever the mean heat exceeds 75° of Fahrenheit. All hot countries seem equally to favor the growth of its fruit; and it has been cultivated in Cuba, in situations where the thermometer descends so low as 45°. Now, this tree, which yields a nutritive and grateful food,* might be cultivated to an extent immensely greater than has yet taken place. Humboldt remarks, that a European, newly arrived in the torrid zone, is struck with nothing so much as the extreme smallness of the spots under cultivation, round a cabin which contains a numerous family of Indians. He mentions this circumstance, to confirm his statement of the prolific and nutritive qualities of the tree; but it, at the same time, indicates the vast extent of ground which might yet be brought into cultivation, and, as a necessary consequence, the amazing accession which, by this means alone, might be made to the population of the tropics.

In temperate climates, the recent introduction of the potato, as an article of husbandry, shows, in one instance,

* "The ripe fruit of the banana is preserved, like the fig, by being dried in the sun. This dried banana is an agreeable and healthy aliment. Meal is extracted from the fruit, by cutting it in slices, drying it in the sun, and then pounding it."—*Library of Entertaining Knowledge—Vegetable Substances.*

what may be done for the more extensive production of human food, by exploring the storehouse of Nature. The growth of this plant has, within the last century, produced a new era in our agriculture. "The potato has this great and peculiar advantage, over all other substantive esculent vegetables, that it can be not only cultivated in places where no others can be profitably raised, but that it can be cultivated there at small expense; while it is less subject to disease, and more secure against degenerating in those situations than on richer lands. Consequently, in a soil so diversified as that of Britain," and the remark may apply to other regions, "an almost unlimited supply of potatoes may be raised, without any diminution of the breadth of profitable crops of the cerealia, the legumes, or indeed of any other useful plant."* The author from whom I have quoted these sentences, gives, from Mr. Jacob's Corn Tracts, a calculation, by which it appears that an acre of potatoes will maintain a number of individuals, more than double of what is capable of being maintained on the same place, from wheat, the most nutritive of all the corn plants. Here, then, we have an example of a power, inherent in vegetable nature, which has only lately been developed, by means of which, alone, a capacity of human nourishment has been obtained, surpassing its former limits, at a rate which cannot be estimated at less than three or four-fold.

It is very remarkable, and must be regarded as altogether providential, that this accession to human food should have been obtained at a time when, on account of the natural progress of society from other causes, such an accession had become a matter of great importance. This, indeed, is but an example of those facts in the history of the human race, in relation to food, which distinctly mark the hand of an overruling Intelligence. The whole records of the world are full of similar instances. They confirm the truth of the principle, already stated, that the intention of the Creator, in adjusting the relation between the demand for subsistence, and the supply,

* Library of Entertaining Knowledge—The Potato.

was, that there should be a constant pressure on the one hand, and a constant power of yielding to that pressure on the other; and they give additional assurance to the anticipation, that this system will continue, so long as the human race exists.

In connexion with this subject, and as a further proof that vegetable nature is full of resources, which have not yet been called into action, I may refer to the curious statements contained in Mr. Turner's recent volume, to show that human nutriment is contained in all classes of the animal and vegetable kingdoms. From an interesting induction of particulars, this author shows, that there is scarcely a living creature, which is not used as food by some of our species. After particularizing many of the most nauseous of the larger animals, both belonging to the land and waters, as eaten with relish by different tribes, he adds, —"But ants, grubs, snails, worms, and reptiles, are as repulsive, yet these are liked and used. Snakes and serpents are eaten in Egypt and Western Africa; lizards, mice, rats, and caterpillars, also on the Niger; ants are eaten by the Hottentots, either boiled or raw, or roasted after the manner of coffee. Several kinds of grubs are eaten in civilized communities, as well as by those we deem savage. Mr. Kirby concurs with Dr. Darwin in recommending the addition of both cockchafers and their larvæ, to our own well-filled tables. The Greeks feasted so much on their grasshoppers, as to distinguish critically their different flavors. Locusts are highly valued, and dressed in various ways, by the Arabs, and are not less precious to several other nations."*

From all this, Mr. Turner concludes, that the convertibility of animal matter into means of subsistence, is bounded only by the use of it; and that whatever any people are not in the habit of feeding on, is either unsalutary or unpalatable to them; but whatever they accustom themselves to, becomes agreeable and nourishing; and, therefore, as long as there are any classes of the inferior animal kingdom on the earth, mankind cannot starve.

* Sacred History of the World, vol. iii. Letter 31.

From the animal, our author directs his attention to the vegetable compartment of Nature; and he finds it as universally applicable to human nutrition. He particularizes a vast number of vegetable substances not commonly used as food by Europeans, which are freely employed and well relished by other communities of men, and among others, grass, and the leaves of trees and herbs, are enumerated. "One of the most remarkable facts," says he, "to show the universal applicability of all vegetable matter to human nutrition, is, that in the Quilimane country, in Southeast Africa, grass is made an article of human food, and is cultivated for that purpose, and is cooked into a palatable porridge.* A still more extraordinary circumstance of the same bearing, is, that the leaves of trees and herbs are both applicable and sufficient for the sustenance of a human being, who has been accustomed to the use of them, and are capable of giving both strength and pleasurable vitality. In the department of the Var, a man is now living, who, having been at one period of his life reduced to great want, was obliged to eat *raw leaves* of trees, herbs, &c., to satisfy his hunger. From being accustomed to it, he now *prefers* this diet, and adds only three or four ounces of bread and a little wine, to his daily fare, with which he could easily dispense. He is remarkably strong and healthy."†

But not only are grass and leaves capable of affording nourishment to the human frame; what is still more remarkable, it has been found that this property belongs even to the substance of the hardest wood. We owe this discovery to the German professor, Autenrieth. Dr. Prout has thus described the preparation of it, in the Philosophical Transactions:—"First, every thing that was soluble in water was removed by frequent maceration and boiling. The wood was then reduced to a mi-

* Owen's Voyage, vol. ii. p. 51.

† Athenæum, 1835, p. 627. [The author here introduces a story, quoted by Turner, of a "wild boy" found in Germany in 1749, who subsisted on grass. As the creature, from the description of him, was probably a beast, and not a boy, the story is now omitted, as irrelevant, and unworthy of notice in the present connexion.—Am. Ed.]

nute state of division ; that is, not merely into fine fibres, but into actual powder, and after being repeatedly subjected to the heat of an oven, was ground in the usual manner of corn. Wood, thus prepared, according to the author, acquires the smell and taste of corn flour. It is, however, never quite white, but always of a yellowish color. It also agrees with corn flour, in this respect, that it does not ferment without the addition of leaven ; and, for this, some leaven of corn flour is found to answer best. With this it makes a perfectly uniform and spongy bread ; and, when it is thoroughly baked, and has much crust, it has a much better taste of bread than what, in times of scarcity, is prepared from the bran and husks of corn. Wood-flour, also, boiled in water, forms a thick tough trembling jelly, like that of wheat starch, and is very nutritious."*

For further details, I must refer the reader to Mr. Turner's instructive work. Enough has been said, to warrant the conclusion, that, with few exceptions, all the plants of the field, and trees of the forest, as well as all the animal creation, have been purposely so formed, as to yield, when properly prepared, nutritious and agreeable food to mankind ; and we may confidently concur with this author in his averment, that, "as far as the question of our subsistence rests between man and his Creator, there is a most diversified and abundant provision made for him, which will never fail for his support, through all his generations, let them spread as they may, as long as herbs and trees can grow, or animals exist, in addition to all the corn and cattle that can be reared."

FOURTH WEEK—THURSDAY.

HUMAN FOOD.—VEGETABLE AND ANIMAL.

ALTHOUGH there are probably above a hundred thousand vegetable productions in the world, by far the greater

* Philosophical Transactions, 1827, part ii. p. 318.

part of which might be converted into articles of human food, there are only a few that can strictly be included under the title of necessaries. Of those species, that afford the kind of nutritive matter which constitutes bread, emphatically called the staff of life, the number is very small, unless we extend the kinds, by taking into account those which modern ingenuity has, by means of various processes, added to the list. The whole amount may be nearly comprised under the heads of the cereal grasses, rice, the leguminous plants, farinaceous roots, such as the potato, and the fruit and pith of some palms and bananas. The other more numerous classes of vegetables, which supply food to man, may be regarded more as luxuries than necessaries; they certainly afford, however, an agreeable, and sometimes useful variety.

The inhabitants of very warm climates, live principally, and often entirely, on vegetable food; but animal food, as it seems more necessary, is used in greater abundance, in temperate and polar regions. I have formerly mentioned the nature and qualities of the domestic animals, furnished by Providence, for the supply of this want; and I shall here merely state, on this subject, that they are not only disposed to live gregariously, but are readily brought under obedience, becoming docile and inoffensive, and that they are all granivorous and herbivorous animals, classes for which ample provision has been made in the spontaneous fruits of the earth, or the simplest operations of agriculture, and which are particularly suited to their domestic condition, by the absence of that propensity for devouring each other, which exists in so many other species. It has been remarked, too, that the order to which they belong is, in general, less mild and tractable than that of the carnivorous animals;* and, if this be the case, the deviation from the rest of their class is particularly worthy of observation, as indicating a peculiar intention in the Creator.

The flesh of all the domestic species, is acceptable to the human palate, and is, in some degree, necessary to

* M. Frederic Cuvier, Mem. du Mus.

those who are exposed, in a cold or temperate climate, to much fatigue. It is, however, liable to rapid decomposition, especially as the heat of the season advances; but a providential provision has been abundantly supplied for the removal of this difficulty, in the preservative quality of common salt,—an article widely diffused in mines, or easily extracted from the waters of the ocean.

Besides the animals already mentioned, there are various kinds esteemed as food, which are obtained by the labors of the hunter and fisherman; and there are also almost all the herbivorous species of birds, together with their eggs, which form numerous and grateful varieties. The adaptations and arrangements which have bestowed these various productions upon us, need not be again adverted to; but it may not be unworthy of notice, in passing, that the flesh of the horse, the ass, and the dog,—animals which are so useful to us when alive,—is so little acceptable as food, that, unless under extraordinary circumstances, we are not tempted to feed upon it; a wise provision, which not only serves to encourage in the mind a humane feeling towards creatures destined to become our assistants and familiar companions; but which affords an additional supply, a store in reserve, that may be resorted to, in case of the necessity arising from famine.

The following observations by Dr. Kidd, on the analogies between vegetables and animals destined for human food, are curious:—"In the animal kingdom, all those species which serve extensively as food,—as oxen, and sheep, and swine, among quadrupeds; the turkey, the common fowl, and the duck, among birds; and the salmon, cod, herring, &c., among fish,—are either naturally of a gregarious nature, or are easily kept together, by human means, in large bodies; and, therefore, are much better adapted for the supply of food to man, than if they were either solitary or scattered into small groups. And so it is with respect to the most useful vegetables. They are capable of being cultivated gregariously, as it were, with comparatively little labor and attention. Thus, in our own and other European countries, the daily laborer, after his hours of hired work for others, can cultivate his

own private field of wheat or of potatoes, with very little additional expense of time and trouble. And as to the cultivation of the tropical fruits, scarcely any labor is required for that purpose; so that, to the less hardy natives of those climates, the assertion of the poet is strictly applicable,—

" ' Fundit humo facilem victum justissima tellus.'*

" A further analogy is observable in the degree of fertility of the respective vegetables and animals. Among the animals which are destined for the food of man, the species are, on the whole, prolific, in proportion as they are either small in size, or inferior as to the nutritive qualities of their flesh. The cow, which is a large animal, produces one usually at a birth; the sheep, very commonly, two; swine, several. Poultry, which are comparatively small, are capable of rearing a numerous brood; and fish, which are of a less nutritious nature, and generally smaller than quadrupeds, are still more prolific. And similarly in the vegetable species, which are destined for the food of man, the numerical quantity of the product, in a given area, is greater or less, in proportion to the individual size of the fruit produced. Dates, which are smaller than cocoa-nuts, are produced in greater numbers than the latter; and, in a square yard of soil, a much greater number of grains of rice or wheat is produced, than of roots of the potato.

" Lastly, another analogy may be observed with reference to the palate. The taste of the flesh of those species which constitute to man the staple, as it were, of animal food, is acceptable to most palates, and is neither so rich as soon to cloy the appetite, on the one hand, or invite it to luxurious indulgence, on the other; nor so devoid of flavor, as to deter us from taking a proper quantity. And is it not the same with respect to those vegetable species, which are among the most ordinary and necessary articles of food? If corn, and the potato, and the cocoa-nut, had the pungency of euphorbium, the nauseating quality of ipecacuanha, the heat of pepper, or the

* [The faithful earth supplies the easy food.—Am. Ed.]

lusciousness of sugar, on the one hand, or the insipidity of powdered chalk on the other; what an undertaking would it be, to satisfy the craving of hunger with any of those vegetables!

"It will be in vain to urge, in opposition to the foregoing position, that custom, in particular instances, renders many things tolerable, and even pleasing to the taste, which at first were disgusting; for it would be found, that, in such instances, custom has usually risen from necessity, which often brings us acquainted with strange companions; or from a depraved taste. None have ever consented voluntarily to feed on the flesh of vultures or of ravens; and *caviare* will always be *caviare* to the multitude."*

If there be any thing overstrained in the statement of these analogies, the observations at least tend to present to us proofs of adaptation and beneficent design, and to remind us of those numerous contrivances, by which the organized world is so singularly fitted for the subsistence and happiness of man.

FOURTH WEEK—FRIDAY.

HUMAN FOOD.—FRUITS—THEIR QUALITIES.

ONE of the peculiar provisions for the food of animals, with which vegetable nature abounds, is that which attaches the seed to an edible fruit. These productions are certainly intended by the Creator for the use of the lower as well as the higher species of animated beings, and, while there are some kinds appropriated exclusively to the former, there are qualities bestowed upon others,

* Kidd's Bridgewater Treatise, pp. 218—221. [The barely passable pun with which the above extract concludes, will need explanation to many. The word *caviare*, as used the first time, signifies a kind of food prepared in the south of Europe from the roes of fish; as used the second time, it has the force of a Latin word, meaning Beware. Multitudes, nevertheless, eat this *caviare*, especially in Lent, and are glad to get it.—AM. ED.]

which show them to be peculiarly destined to add to the enjoyments of the latter. It is to these qualities, as indicating beneficent design, that I intend, in the present paper, to advert.

I begin by remarking, as a proof that fruits were created by the Author of Nature for the express purpose of food, that, although they are appendages to the seed, they are in no sense essential to it. As far as the preservation and perpetuation of the plant are concerned, they are mere superfluities; and, as nothing is made in vain, we must look for some other purpose in their formation. Nor shall we be at a loss to perceive that this purpose is what it has already been stated to be. Let us consider some examples. For these, I shall have recourse to the recent posthumous work of Dr. Macculloch.

In the strawberry, the fruit is the receptacle, a spongy substance, with an expanded surface, to which the seeds are attached superficially. Though in a very different class, with a very different law, as to the relation between the flower and the seed, it is a similar part, which sustains the seeds in the thistle and dandelion. The analogy of these, as well as of many in the same division with itself, shows that, if the receptacle was necessary to the strawberry, it certainly need not have been a fruit. The dry receptacle of the thistle, is of equal use, in the support and protection of the seeds. The pineapple may be associated with this, without attending to botanical accuracy. Here, a whole plant has been occupied in producing a single fruit, almost as large as itself, while it is an entire superfluity, and, also, if we compare it with the fruit of the strawberry, much more complicated in its arrangement. It is interesting to remark, too, that the propagation of the plant, in both cases, is provided for by offsets, independent of the fruit, as if it had been foreseen that the use of the fruit would destroy the seeds which it contains. In the pineapple, a similar provision is further made, by what our author calls "that obstinately vital production, the crown," which is not only unpalatable, but offensive to the taste, and which seems,

therefore, intended to be preserved for the purpose of propagation.

Berries, form a far larger and much more various class of fruits. It is here equally easy to convince ourselves, that the edible fruit is a pure superfluity. The number of dry, or, to human taste, insipid or disagreeable berries, is far greater than that of the others, while, in those, the seeds are equally preserved, and equally useful for food to the lower animals. The berries, which are intended for the use of man, contain remarkable contrivances for their preservation. There is, in many instances, a distinct mechanical separation, not only tending to prevent fermentation, like what is observed in the orange and the raspberry, but also to confer firmness on a fluid. Sometimes, that structure is so minute, that it is not easily detected, resembling the vitreous humor of the eye ; and sometimes, there is a gelatinous or mucilaginous fluid united to the acid juice, which equally checks fermentation, by preventing the intestine motions of the fluids. This is the case of the grape, the gooseberry, and the currant.

The apple furnishes a familiar model for another class of fruits, though the variety under it is very limited. If this structure should be considered as a mere protection for the seeds, it would be a very superfluous one ; and the real intention is not less visible. In the case of the cashew, externally resembling the apple, the fruit is an absolute superfluity ; since it does not even enclose the otherwise fully protected seed.*

The cherry and the peach are examples under that class of fruits which botany terms drupes. Here the superfluity is very striking, because the seed is completely protected by the stone, as in the case of the walnut and filbert, where there is no fruit. And here, also, we must admire that cellular structure through which the purposes already named are accomplished ; while in the peach, in

* [The cashew, (*Anacardium indicum* and *occidentale*,) is a tropical fruit, consisting of a juicy pulp, with a bright red or yellow skin, bearing at its end a seed or nut, in shape like a large bean, covered by a double shell.—Am. Ed.]

particular, the firmness is very remarkable, when the actual quantity of fluid in the total bulk is considered. A fluid was the thing to be produced in all the instances mentioned; but that was to be rendered transportable and durable; and, by means, that, as our author observes, almost appear magical, it has been made to assume the form of a hard and resisting solid.

There are some fruits which are naturally, or on account of their uses in the vegetable system, very transitory and perishable. If these had all ripened at the same period, as might have been expected, seeing that they all depend for their progress towards maturity on the advance of the seasons, we should have been overwhelmed with their numbers for one short period, and should, during all the rest of the year, have been destitute of this means of enjoyment. But a provident Creator has arranged otherwise. Like flowers, which are also formed for human enjoyment, they have been commanded to appear in succession, so that, as one vanishes, another is ready to supply its place. We experience this, even in our own short summer. It is more extensively the case in tropical climates, where these productions are far more numerous, and their uses, both to man and the lower animals, much greater.

But there is another, and not less beneficent, provision with regard to fruits, which belongs more directly to our present subject, as connected with the autumnal season; I mean, that there are some kinds, so formed as to admit of being stored for future use. This is particularly the property of some kinds, which do not ripen till this late period of the vegetable year, a fact, itself indicating a providential arrangement, as providing a supply for the winter months. It is worthy of remark, that of those which are thus destined for future use, several do not ripen on the parent tree, a property which, while it presents a great chemical difficulty, was necessary, in accordance with physiological principles, to the preservation of the fruit, which, as soon as life becomes extinct, must rot. The stored apple is not less alive than its seeds. Its principle of vitality remains,—one of those inexplicable

detachments, like the sap, from the general life ; and it continues to act on the fluids which the vessel contains. Thus does it convert the malic acid into sugar ;* while, in the same manner, various other conversions are effected, not one of which extra-organic or common chemistry has been able to perform.

There is a contrivance similar to this in some of the perishable or truly summer fruits of a hot climate, which must not be passed over. The lemon and the orange, ripen, like the apple, at a distant time, without the aid of the parent tree, without light and without heat ; giving us, in the regions of snow, all that in this tree could have been derived from a tropical sun. An object so familiar is, as usual, little considered ; but independently of this power of delay, of the extraordinary conversion of the citric acid into sugar, in this little and strange laboratory, and of an investment which, appointed for the defence of the interior, is, moreover, so contrived, that it shall furnish the greatest resistance when that is most needed, there is a beautiful mechanism, already alluded to in regard to other fruits, through which the enclosed fluid is preserved, under a great chemical difficulty. Had the rind enclosed nothing but a fluid, as the cocoa-nut does, it must, according to chemical principles, have fallen into fermentation, and been destroyed. But this is guarded against, and in the precise manner which science would have suggested. Each compartment is so small, that fermentation cannot take place,—a structure which was not necessary, as regards either the vegetable or the produce.†

Before concluding this article, I may allude, in a single sentence, to the power of preserving fruits by art. The fig, the date, and the grape, are preserved with little aid from human industry ; and the principle which secures these from decay, points out the means of preserving other fruits, naturally more perishable. The fundamental pro-

* [Malic acid is the acid peculiar to the apple and similar fruits. The word is formed from the Latin, *malum*, apple.—Am. Ed.]

† Macculloch's Attributes of God, vol. iii.—'On the pleasures provided through the senses of odor and taste.'

vision for this is laid in sugar. Incapable of change, itself, this remarkable, and almost universally diffused substance, preserves not merely the vegetable, but even the animal organizations from chemical destruction; and, where Nature has not added it to the fruits in sufficient quantity, art is enabled to supply it, with the same useful results, in modes which are as familiar as they are numerous.

FOURTH WEEK—SATURDAY.

HUMAN FOOD.—DRINK.

It is interesting to remark the difference in the mode adopted by the Creator, between the provision for satisfying the cravings of thirst and of hunger. Both are necessary instincts, the one bearing reference to the supply of solid, and the other of liquid nourishment, to the animal frame. Both might have been afforded by similar means; but, if meat had been rendered as abundant as drink, one of the greatest incentives to exertion would have been wanting; and if, on the contrary, the supply of liquid had been only equal to that of solid food, the necessity which would thus have been imposed, of making a double provision for subsistence, would have probably been so overpowering, as materially to impede the propagation of mankind, and even to endanger the extinction of our race. While our meat, therefore, was wisely restricted, the supply of drink was rendered as abundant to human beings, as to the other orders of living creatures. Water was made a common beverage to man and beast, and thus as constant and accessible a gift of liquid food is afforded to him, as there is also of solid food to the cattle, in the grass which is so liberally spread over the face of the earth.

The provision which has been made for the supply of this necessary, has already been adverted to,* and is very

* See 'Spring,' Papers on Mountains, Rain, Springs, Rivers, &c.

remarkable. All organized existences, vegetables, as well as animals, must drink. Vegetables are fixed to the soil, and therefore their drink must be carried to them. This is done in the very striking arrangements by which rain is caused to fall in gentle showers, and in due proportion. For this purpose, the immense reservoir of the mighty ocean is made to distil its waters into vapor, which floats in clouds, and is dispersed by every breeze, till, by another system of contrivances, it is condensed into drops, and falls softly on the expecting earth. For animals, another provision is made. The moisture, which falls on the surface of the earth, and especially on the mountains, is superabundant for the purposes of vegetation. Being intended also for the use of the living world, it is collected in reservoirs in the bosom of the elevated grounds, whence it gradually issues in springs; which, flowing in rivulets in all directions, is collected into rivers, and furnishes, in most regions, a copious supply of drink to which there is ready access; while the remainder returns to mingle with the vast expanse of waters, from whence it had been evaporated, till it again becomes subjected to a similar process.

Such is the wise and beneficent arrangement in vast regions of the earth, and more particularly in those genial climates first inhabited by man; but there are countries, and indeed extensive districts, where great irregularities in this respect take place. In Egypt, for example, and in a large stripe of the globe under the same parallel of latitude, rain seldom falls at all, while, under the tropics, the supplies are partial and fitful. But there are, in these instances, compensations which very strikingly prove intelligence and beneficent design. In Egypt, and various other countries, periodical inundations supply the place of rain. In other quarters, where the free soil absorbs the moisture, strata of rock or of earth, at a certain depth, prevent it from being carried beyond the reach of human industry; and, in many cases, when man employs his skill in the search, he is rewarded by copious springs rising to the surface, and flowing far for the refreshment of the inhabitants. In all these instances a providential discipline is employed, similar to that which we have seen so ex-

tensively established with reference to solid food. The natural supply is denied, that human ingenuity may be called forth, exercised, and crowned with success. What is remarkable in such arrangement is this, that the deficiency of liquid food takes place, generally speaking, only in those districts where solid food is abundant. It seems as if the common Father, while He considered it too severe a trial to cause the necessity of employing man's ingenuity in providing both for meat and drink at once, saw proper, where the stimulus to exertion was removed by a spontaneous abundance of the one species of food, to supply that stimulus by a natural deficiency of the other.

The kind of industry and skill to which the deficiency in question has given rise, is various, depending on the nature of the supply to be obtained; and here, too, there are some peculiar adaptations. If it is to be collected from the heavens in the periodical falls of rain, clay or other impervious materials are provided by Nature for retaining it in tanks, while means are afforded for its being purified by filtration, or preserved and rendered salutary, when converted, by admixture with other substances, into a liquor, not readily subject to decomposition. If it must be sought for at considerable depths, it either springs up to the surface, as I have said, in the form of what are called Artesian wells, or is forced to ascend by the very curious, but familiar and convenient apparatus of the pump, the principle of which depends on the pressure of the atmosphere, a natural property which was long but little understood, even after it had been applied to practice.

It is remarkable to what extent, regions, otherwise barren and uninhabitable, are rendered fit habitations for human beings, by means such as these. The faculties of man are thus successfully exerted, and his ingenious toil rewarded. As the powers of the mind are expanded and the population of the world is increased, new encroachments are thus made on the desert places of the earth; the wilderness is caused to blossom as the rose, and the boundaries of man's abode are extended. There are yet other provisions made by the Creator, for supplying a

deficiency of liquid for quenching thirst. Some plants, which grow in arid soils, are wonderfully provided with an agreeable and salubrious liquor, secreted from their vessels. The cocoa-nut, and the pitcher plant, may be mentioned as familiar instances of this, not less obviously beneficent than they are singular.

The power of distilling seawater by art, is another method by which, in extensive localities, the want of wholesome drink may be remedied. This is but an imitation of the natural process ; and it is not to be forgotten, that all the supplies of fresh water with which the earth is replenished, are derived from the brine of the ocean, where the liquid exists in a state unfit for the sustenance of both vegetable and animal life. We should, indeed, be wanting in gratitude to the Supreme Designer, if we did not recognise his goodness in that provision, by which the water of the sea, when evaporated and formed into clouds, is separated from those noxious particles, with which, doubtless for wise purposes, it is in its great receptacle naturally combined.

FIFTH WEEK—SUNDAY.

"THE BREAD OF LIFE."

In the preceding papers, the reader's attention has been directed to the goodness of God, as displayed in the wonderful provision which has been made for the support and refreshment of the human frame. It is most interesting thus to trace the hand of a Father in such wise and beneficent arrangements, and to be able so clearly to discern his providential care in the articles of food which we daily consume, but which, nevertheless, we are so apt to receive and to enjoy without one thought of Him.

But there is a subject still more deserving of grateful acknowledgement on the part of man, which the foregoing considerations naturally suggest for our meditation on this

day. I allude to that provision, which a merciful God has made for the support and refreshment of our immortal part. This has been furnished in inexhaustible abundance. Even as in animated nature the mother abounds with sweet and nutritious aliment for her offspring, so, in the kingdom of grace, the most suitable nourishment has been tenderly provided by our Heavenly Father for all who are born of Him. There is what is called in Scripture, "the sincere milk of the word," viz., the simple truths of the Gospel in all their native plainness, and sweetness, and efficacy,—uncorrupted, unimpaired, pure as they originally came from the Divine Mind. This is the heavenly aliment which has been prepared for the "new-born babes in Christ," of whom the apostle Peter speaks; this they are taught to "desire," that they may "grow thereby," and its nourishing virtue is derived from the sacrifice of Christ, which alone gives efficacy to every thing that the Gospel has revealed.

But, just as a child, when it arrives at a certain age, requires food of a stronger kind than milk, so he that is born of God, when he has been taught the simple truth, as it is in Christ, longs for a more accurate and extended and intimate acquaintance with his nature, person, character, and finished work. Nor is he precluded from attaining to this, his more mature desire. "I," says Jesus, "am the bread of life; he that cometh unto me shall never hunger."

Bread has well been called the staff of life. In all nations, it is the principal article of food. Now, to Christ, this similitude may well be applied, inasmuch as it is from Him, that the Christian derives nourishment to strengthen and sustain his spiritual existence. Deprive him of Christ, and all his holy affections, devout feelings, heavenly aspirations, and pious resolutions, must be as if they had never been. Deny a man the bread that perisheth, and he may have recourse to some other kind of food, perhaps more nutritive than itself. But let his soul be prevented from feeding on Christ crucified,—"the bread of God, which giveth life unto the world,"—and, whatever other supposed means of spiritual subsistence he may

have recourse to, it will impart to him no nourishment at all; it will leave him as feeble and unsatisfied as before. From the moment he ceases to receive support from Christ, his spiritual decline begins; and with sure and gradual progression it goes on, the soul becoming fainter and fainter every day, and sinking into its original state of death, till again it feeds on the Bread of Life. But, on the other hand, how feeble soever the soul may be, if Christ *be* received and fed upon as its only sustenance, it *must* live. Nothing can prevent its growth in grace. Christ proves at once its antidote and its support. The deadliest poison that the Adversary may have succeeded in infusing, has no effect in hindering the progress of resuscitation. It must go on; and just in proportion to the frequency of the applications to the Bread of Life, and the eagerness with which it is longed for and devoured, will be the rapidity of that resuscitation, and the stability of that principle of life which is thus implanted in the soul. And it is only by virtue of this, that the Christian is enabled to maintain a uniform advancement in the Divine life, rising to the "fulness of the stature of the perfect man," "growing into the image of Christ from glory to glory, even as by the Spirit of the Lord."

In the bread which man uses for the support of his earthly tabernacle, there is always more or less of what is either injurious or of no use. He that partakes of the Bread of Life, incorporates with his soul (if I may use the expression) nothing but what is purely and intensely nutritious. Whatever view may be taken of Christ's character, as represented in Holy Writ; whether He be considered in the capacity of a Prophet, of a Priest, or of a King; whether He be regarded as setting his people an example that they may follow his steps; as praying for them; as pouring forth his blood in their behalf; or as holding out the offer of pardon to all mankind,—nothing but the most unmingled benefit is to be derived from the contemplation. Should it appear to be otherwise in any case; should the soul that thus views Christ, fail of being elevated, ennobled, spiritualized; we may be sure that the fault lies not in the *food*, but in *him that partakes of it*.

Under the similitude of the Bread of Life, when considered as distinct from the sincere milk of the word, of which I have already spoken, Christ is evidently to be regarded, in the more extended discoveries of Himself, which by his Spirit he makes to the believing soul. Bread is strong food compared with milk, and more suited to the condition of the human frame, after it has attained to a certain age. In like manner, the deeper, less obvious, and more enlarged views of the truth as it is in Christ, are better adapted to the condition of the soul, after it has attained to a certain degree of advancement in the Divine life. The lively Christian does not rest satisfied with slight and transient views of the Saviour whom he loves; he longs, with the avidity which hunger implies, for a more profound and intimate acquaintance with all that pertains to Him and the Gospel; and in order that he may be satisfied, in so far as the Divine will allows, (for there are "deep things" which belong exclusively to the Lord,) he is directed to the Bread of Life, and to the Bread of Life alone; he is taught to contemplate Christ in all his offices; in all his excellency; in all the self-denying love which He has shown to the human race; in all the fulness of his finished work. And the more lively the faith with which he dwells on these subjects, the more extensive are his attainments in the Divine life, the more enlarged, confirmed, and decided do his spiritual views become.

But not only does the Bread of Life nourish and refresh the soul, he that partakes of it in a right spirit, experiences, in the act of doing so, emotions far more exalted, delightful, and refined than any that are ever known by the unregenerate man. The Almighty has, in his great goodness, connected certain pleasurable feelings, with the act of satisfying the natural appetite for the food that perisheth. But in these, there is little that is not enjoyed in common with us, by the very lowest of the brute creation. The pleasures inseparable from a right participation in the Bread of Life, are essentially heavenly and Divine; nor do any emotions more pure and holy swell the bosoms of the loftiest angels that surround

the throne of the Eternal; and what language can express the calm, yet exquisite joy with which the real disciple of the Cross dwells on the character and work of "Christ crucified, the hope of glory." He feels that He has died for him, and therefore that he has a peculiar interest in his mediation and intercession. All the blessings of the new covenant he appropriates to himself; his doubts and fears yield before the convictions of his judgement and his heart; the peace which passeth all understanding reigns within him: Christ is, in his eyes, "the chief among ten thousand, and altogether lovely," He is "all his salvation and all his desire."

Let every one, then, that has any regard for the salvation and comfort of his soul, come without delay to Christ. He that applies to Him for bread, is in no danger of being sent away empty, or being offered a serpent. How painful to behold such multitudes of our starving fellow-creatures, "spending their money for that which is not bread," and greedily feasting on worldly and sensual objects,—"those husks which the swine do eat!" In them there is no *nourishment;* but O! there is enough of *poison* in any one of them, to destroy the soul. It is in Christ, alone, that true strength and refreshment are to be found; and blessed are all they that feed on Him with an earnest and enlightened faith. We may hunger for the bread that perisheth, and never have the craving of our appetite allayed; but he that hungers for the bread that hath come down from Heaven, and takes it as it is offered to him in the Gospel, has all his wants supplied; the longings of his soul are satisfied; his eye brightens with an expression of lively hope in the Divine promises, nor does he ever know what it is to hunger, again, without having abundance within his reach. W. W. D.

FIFTH WEEK—MONDAY.

HUMAN FOOD.—MILK.

THERE is a provision in Nature for the support of every young animal that comes into existence. The various tribes of the snail, or caterpillar, are ushered into being on the leaves of the plants best suited to the supply of their wants; and some of the insects that fill the air with their joyous hum, have spent the first period of their lives in the element of water, which at once protected them from outward injury, and furnished the nutriment that was to mature their frames for future exertion. No preparation, however, that has been made for the support of infant existence, is more wonderful, than that fluid, from which the human race, in common with all the brute creation, and some even of the inhabitants of the ocean, derive their earliest nourishment.

Milk is neither a vegetable nor an animal substance, but a compound of both; and in this, it differs from all other food. It consists of oil, curd, and sugar, compounded in different proportions, according to the nature of the animal from which it proceeds. Thus, the milk of the cow and sheep contains a greater proportion of the caseous and more nutritive matter, and that of the ass and mare more of the oily and saccharine.

It is delightful to observe, in this sweet and nutritious beverage, the care which has been taken, by Him who "tempers the wind to the shorn lamb," to provide for the helplessness of the young, both of man and beast. Who can behold the eagerness with which a child, newly born, applies its little lips to the breast, without raising his thoughts in wonder and admiration to the "Parent of all," by whose wisdom and tenderness it has been taught thus to support itself in life! Nothing can perfectly supply the place of the mother's milk. Mark the instinct which actuates the young of the lion, the tiger, and other beasts of prey. They do not roam at large, like their

harmless compeers; but, their eyes being at first unopened, they remain in dens till they become sufficiently strong to combat their enemies, and find food for themselves. So long as they are too feeble to join in the chase, Providence has inclined them to be stationary, and to await the return of their dams, for the satisfaction of their hunger. Nor is it unworthy of remark, that, as the carnivorous animals have a much smaller quantity of milk than the other mammalia, they bring home their prey alive, that their young may suck its blood. Look, again, at the lambkin, or the calf. When it begins to feel the pangs of hunger, it is not left to make a painful and fruitless search among the vegetable tribes, till it finds a pasture sufficiently tender for its delicate organization; but its most grateful food is close at hand; it goes to it at once, and without fail; it receives it as instinctively as it is offered by its dam. Thence it derives its strength, until its continually unfolding powers become strong enough to bear the food common to the species in more advanced life.

Observe the young of cows, and other graminivorous animals, how they follow their mothers in the pastures where they feed, gradually learning to crop the young clover, or the tender grass. In the safe and pleasant fields, nothing can injure them, defenceless though they be. The sunny slope, and smooth enclosure, afford them ample space for the exercise of their limbs; and there are few fairer pictures of innocent enjoyment, than their graceful gambols in the meadow, drawing vigor, as they leap and run, from the soft spring-breezes, or basking in the most perfect repose beneath the genial beams of the sun. Many beautiful emblems of the Christian life have been furnished by such scenes as these. The happy pastures prepared by "the Good Shepherd" for his flock; the calm delight they experience while resting in the sunshine of his smile; their growth in spiritual strength and beauty beneath the breezes of the "heavenly wind" that bloweth where it listeth, even the influences of the quickening Spirit;—all these are shadowed forth in the fatherly provision which He has made for a feeble and short-lived race, destined for the use of man.

All quadrupeds, from the majestic elephant to the light squirrel and the humble mole, are *mammalia;* and widely though the habits of their being in many respects differ, the property of sustaining their offspring, by their own milk, is common to them all.* There are few instances in which contrivance for a kind and benevolent purpose is more distinctly to be perceived, than in the formation of the reservoirs from which the young of mammalia derive their sustenance. The breasts are what are called by anatomists, *conglomerate glandules*,—composed of a vast number of little knots or kernels, each of which has its secretory vessel, in which the milk is formed. By a very beautiful process, these are made to unite into many small separate trunks, with cellular substance lying between, which, joining, constitute a vessel of sufficient capacity to contain a considerable quantity of the delicious fluid, thus gradually distilled. From this, it has, of course, a constant tendency to flow forth, by which it might have been lost, or the young, in applying their mouths to the breast, might have been in danger of choking from the copiousness of the supply. To prevent this, however, the vessel, before being attached to the nipple, is contracted to such a degree, as to render suction necessary, in order to the extraction of the milk.

From the milk of the cow, several wellknown kinds of nourishment are derived. The principal of these, are, butter, butter-milk, curd, cheese, and whey. Butter is nothing but the oily part of the milk, separated from the other ingredients by means of violent commotion. It is a highly nutritive food, and when moderately used, especially in its fresh state, along with bread, or other similar aliment, it is very wholesome, as well as delicious. Butter-milk is the substance that remains after the butter has been taken from the churn. When the best part of the cream alone is used in churning, it forms a very refresh-

* The whale also belongs to this class. "She generally," says Goldsmith, "produces one young one, and never above two. When she suckles her young, she throws herself on one side, on the surface of the sea. In some, the breasts are white ; in others, speckled ; in all, filled with a large quantity of milk, resembling that of land animals."

ing, agreeable, and wholesome beverage. Curd is milk newly coagulated, and, as all the component parts still remain together, it is considered almost as nutritive as milk itself. Cheese is formed by subjecting the curd to strong pressure. Its qualities are different, according to the mode of its preparation, the quantity of oil retained by the curd, and the length of time it has been kept. Though highly nutritious, it is difficult of digestion, and, except by the robust, should be used only as a condiment. Whey is the fluid that remains after the curd and the oily particles have been separated from the milk. As the saccharine and saline ingredients are alone held in solution by it, with the exception of a very small portion of the animal principles, it cannot be very nutritious. But being cooling, antiseptic, and otherwise medicinal, it is highly recommended by physicians in some cases of disease.

The variety of Creative resources is never exhausted; and we are frequently surprised by finding productions which we have been accustomed to consider as peculiar to one department of nature, approached in their qualities, if not altogether identical, in another. It would scarcely be suspected that milk was of this number. But so it is. The Indian of the Cordilleras of South America has his supply of milk from a tree growing at a vast height, amid arid mountains where no cattle can pasture. The cow tree, which was first noticed by a Dutch traveller as growing in the province of Cumana, is thus described by Humboldt with his characteristic spirit:—"On the side of a thirsty rock, grows a tree whose leaves are dry and husky. Its large roots penetrate with difficulty through the stony soil. During many months of the year, not a shower waters its foliage; the branches appear withered and dead; but when its trunk is pierced, a sweet and nourishing milk flows from the wound. It is at the rising of the sun that this vegetable aliment is most plenty. The natives and the black slaves then gather together from all parts with large wooden vessels to catch the milk, which, as it flows, becomes yellow, and thickens on the surface. Some make their abundant meal at the foot of the tree

which supplies it; others carry their full vessels home to their children."* One would wish to know more of this curious production, so bountifully provided for the supply of a thirsty land. We are not informed in how many particulars it resembles the animal secretion from which it derives its name, or to how many of the uses of milk, as above enumerated, it may be applied. W. W. D.

FIFTH WEEK—TUESDAY.

HUMAN FOOD.—WINE.

THE juice of the grape was manufactured into wine in the earliest periods of the postdiluvian world. Scripture informs us, that, soon after the flood, Noah "began to be an husbandman, and planted a vineyard, and drank of the wine." The intoxicating effect which it seems to have unexpectedly produced, has led some to conjecture that the process of fermentation by which wine is produced, was then new to the world, and was consequent on a change in the atmosphere, and in the principles of vegetable life, introduced into our globe by the same disruption which occasioned the catastrophe of the flood. I see nothing either absurd or anti-scriptural in this conjecture. It may readily be allowed, that, even in events which, in one important sense, must be considered as miraculous, the Almighty may have sometimes acted by the intervention of second causes, productive of very extensive natural changes; but, whether this be admitted or not, it may be true that it was the will of the Supreme Governor, that, in the new order of things, some principles, before unknown, should make their appearance. The gradual shortening of human life, the phenomenon of the rainbow, the permission to make use of animal food, and the principle of vinous fermentation, may possibly all be connected with such a change in the system of the natural world.

* Voyage aux Regions Equinoxiales, tom. iv. p. 264.

There is no Scriptural authority, however, for such an opinion; and it must be ranked among those speculations, which may be harmlessly indulged in, but cannot be established by proof.

The art of fermenting the juice of the grape has been familiar in the East, from the time of Noah till the present day; and wine is spoken of as a strengthening and exhilarating liquor in all the ancient records, both sacred and profane. It is curious to notice, however, that wine was not very early introduced into those parts of Europe which are now most celebrated for its successful cultivation. The Phœnicians appear to have transported it into the islands of the Mediterranean, whence it found its way into Greece and Italy. When Rome was founded, this plant seems to have been little known in Italy; but, in a subsequent age, it had become so plentifully distributed, and its produce had risen to such repute, that Pliny mentions the desire of possessing a land of vineyards, as one great cause of the irruption of the Gauls into that country.

The vine was introduced by the Romans into Britain; and it is a curious fact, established by documentary evidence, that this plant was once extensively cultivated in the south of England, where not a vineyard is now to be found.* This is one evidence, among many others, of a change of climate consequent on cultivation. The vine still grows wild in some of the southern counties.

In France, the cultivation of the grape was not common till the seventh century. It has since become the great staple commodity of the southern provinces of that country, where it is more successfully propagated, than in any other region, and where some of the finest wines are made for exportation.†

* The county of Gloucester is particularly recommended by Malmsbury, in the twelfth century, as excelling in its vineyards; and the Isle of Ely was known to the Normans, under the name of the Isle of Vines. Vineyards are also frequently mentioned in the descriptive accounts contained in Doomsday Book.

† In 1823, there were, in France, about four millions of acres under vine cultivation, the annual mean product of which, was twenty-two millions and a half pounds sterling. In the same year, wine and brandy were exported from that country, to the amount of considerably more than three millions pounds sterling.

[In the United States there are several species of the grape, which grow wild, and which, when quite ripe, are sweet and palatable. Some of them are white or green, and some purple. They are not so delicate, however, as the foreign kinds, which are successfully cultivated in gardens, and which are annually sent to market in considerable quantities. At the south and west there is some wine made, both from wild and cultivated sorts, but not in such quantities as to attract attention out of the districts where it is produced.] *

The tendency of wine is to exhilarate and support, and this doubtless is the purpose for which it has been bestowed by a bountiful Creator. But who does not know that there is another side of the picture, and that, instead of good, it is, by the folly of man, but too frequently converted into evil, both to individuals, and to society. What has been already said of ardent spirits, may, less emphatically, however, be applied to wine,—that, when taken to excess, it destroys the body and demoralizes the mind. But let it be observed, that such an abuse is not peculiar to fermented liquors. A liability to misapplication belongs to every sublunary thing; and the immoderate use of any gift is generally reproved and punished, by some unhappy consequence which attends or follows it. Men are taught to read their sins in their punishment. Such is the kind of discipline with which it pleases our unseen Governor to exercise us. The sin is within our reach. But, on the other hand, stands a disapproving conscience, an admonishing Revelation, and a frowning Providence. We may be entangled in the snare, but it is with our eyes open, and at our peril. If we fall, we fall willing victims; and the disasters which ensue, are at once our punishment for the past, and our warning for the future; while a present Deity offers encouragement and strength to the returning penitent. Frequent disregard to these inward and external calls, are justly followed by judicial blindness. The correction becomes, indeed, more severe, but less deeply felt. The heart is wilfully rendered callous, and the

*[This paragraph is introduced by the American Editor in place of an extract from the 'Spectacle de la Nature.']

conscience seared, till debauchery and drunkenness end in ruin; and thus the righteous Governor is justified, while the rebel perishes.

FIFTH WEEK—WEDNESDAY.

HUMAN FOOD.—TEA AND COFFEE.

THERE are two vegetable productions of warm climates, which, in all civilized countries, custom has converted into essential ingredients of ordinary food,—I allude to the leaf of the tea-tree, and the berry of the coffee plant; articles which, being formed into an exhilarating beverage by infusion, are often employed as substitutes for each other, and may therefore conveniently be treated of in the same paper.

The tea-tree is chiefly cultivated in Japan and China. The following description of it, I abridge from Wood's Zoography. "This shrub grows but slowly, and does not arrive at its full size, till it is six or seven years old. It attains the height of four or five feet, and sometimes rather more; the root is black, woody, and branched; the stem is divided into several irregular branches, covered with a thin bark, and tinged with green, towards the extremity of the young shoot. The wood is hard, fibrous, and but sparingly provided with pith. The leaves are attached to the branches by a short slender pedicle, and when at their full size, resemble the leaves of the black cherry-tree, both in figure and color. They are numerous; of an intense green, serrated at the edges, and disposed alternately on the branches. The flowers spring from the axils of the leaves. When full blown, they measure an inch and more, have an agreeable smell, a white color, and resemble in form the common wild rose."*

In Japan, this useful shrub is cultivated, without much care, in the hedge-rows; in China, whole fields are plant-

* [The botanical name of the tea-plant is *Thea*, and it is nearly allied to that genus of beautiful flowering shrubs, the *Camellia*.—AM. ED.]

ed with it, and it is made a subject of considerable attention to the agriculturist. It also grows wild on the rocky mountains, being a more hardy plant than is generally supposed. It is said, that, when it shoots out among the rocks, in inaccessible places, the Chinese have recourse to a singular stratagem to possess themselves of the leaves. These places are the haunts of numerous monkeys, whom the tea-gatherers take care to enrage, by various artifices; and these animals endeavor to revenge themselves, by tearing off the branches, and showering them down on the assailants, who immediately collect the harmless missiles, and strip them of their produce.

Sir George Staunton informs us, that the leaves undergo some laborious processes before they are brought to market. "Every leaf passes through the fingers of a female, who rolls it up, almost in the form it had assumed before it became expanded in the progress of its growth. It is afterwards placed upon plates of earthen-ware, or iron, made much thinner than can be executed by artists out of China. It is confidently said in the country, that no plates of copper are ever employed for that purpose. Indeed, scarcely any utensil in China is of that metal, the chief use of which is for coinage. The color and astringency of green tea are thought to be derived from the early period at which the leaves are plucked, and which, like unripe fruit, are generally green and acrid."*

In the second volume of the Library of Entertaining Knowledge, Mr. Davis explains the following mode pursued by the Chinese, of turning black tea into green, of which he was a witness. "In the first place, large quantities of black tea, which had been damaged in consequence of the floods of the previous autumn, were drying in baskets with sieve bottoms, placed over pans of charcoal. The dried leaves were then transferred, in portions of a few pounds each, to a great number of cast-iron pans,

* Father Le Compte maintains that the color and peculiar qualities of green tea are derived from the use of copper plates, and this opinion has been generally received; but modern travellers unite in contradicting his assertion, and in establishing the truth of what is stated by Sir George Staunton.

imbedded in chunam or mortar, over furnaces. At each pan stood a workman stirring the tea rapidly round with his hand, having previously added a small quantity of *turmeric* in powder, which, of course, gave the leaves a yellowish or orange tinge; but they were still to be made green. For this purpose some lumps of a fine blue were produced, together with a white substance in powder, which, from the names given to them by the workmen, as well as their appearance, were known, at once, to be *Prussian blue* and *gypsum*. These were triturated finely together with a small pestle, in such proportion as reduced the dark color of the blue to a light shade; and a quantity equal to a small tea-spoonful of the powder being added to the yellowish leaves, these were stirred as before over the fire, until the tea had taken the fine bloom color of hyson, with very nearly the *same scent*."

Sir George Staunton states, that all ranks in China, are fond of tea, and that the upper classes are "particularly solicitous in the choice of it." The Emperor *Kimlang* composed a little poem describing the best mode of infusing it, which is chiefly curious as being the production of a Chinese monarch. But he concludes this effort of the royal muse with a sentiment which sufficiently shows the estimation in which this beverage is held in the native country of the plant. It may be thus rendered :—

"Let the nectar fill the cup,
Slowly sip, and sip it up.
As you taste, a magic charm
Every glowing sense shall warm;
While athwart your soul shall steal
Balm each festering wound to heal.
I know—I feel the soothing spell,
But who the soft delight can tell."

It is curious to trace the origin of inveterate habits, such as that which is connected with the production we are considering. The first notice of the tea-plant, by a European writer, seems to have taken place in 1590, when Giovanni Botero, without mentioning its name, states that the Chinese have an herb, "out of which they extract a delicate juice which serves them for drink instead of wine." In 1633, the practice was noticed among the

Persians ; and, in 1639, the Russian ambassador at the court of the Mogul, partook of the infusion, and was offered a quantity of the leaves at his departure, as a present for the Czar, which he refused as a useless article. This beverage seems to have been little known in England, till about the middle of the seventeenth century, when a quantity was brought to this country by Lord Arlington, from Holland, where it had been introduced by the Dutch East India Company, about forty or fifty years before. A pound of tea, in 1666, and for half a century afterwards, sold at sixty shillings. From this latter period, the consumption rapidly increased. In the year 1700, not more than fifty thousand pounds weight were imported into Britain ; but, before the close of that century, nearly twenty millions of pounds were sold at the public sales. The importation is now far more considerable ; and, under the new arrangements consequent on throwing open the trade, promises eventually soon to acquire an additional stimulus.

[Tea is, at present, imported into the United States free of duty, and is in general use, especially as an evening beverage, by rich and poor. The quantity imported in the year 1837, according to custom-house returns, was nearly seventeen millions of pounds, valued at about six millions of dollars ; of which quantity, two millions and a half of pounds, were again exported. Am. Ed.]

The rival luxury, introduced into Europe about the same time with that of tea, is coffee. According to the Abbé Raynal, the native country of the coffee-tree is Upper Ethiopia, where it is still cultivated with success. It is an evergreen of quick growth, rising to the height of fifteen or twenty feet. It has a straight trunk of three or four inches in diameter, bearing a number of branches opposite to each other, furnished with oval entire leaves, somewhat resembling the common laurel. In the angles of these leaves, appear little bunches, consisting of five-cleft white flowers, of an agreeable smell, and resembling the jasmine in figure. The flowers are succeeded by oval berries, each of which contains two seeds, flat and furrowed on one side, convex on the other. These seeds

constitute the article which is so well known under the name of coffee.*

The quality which coffee possesses, of dissipating sleep, is well known ; and it is said that it was this property which originally recommended it to use, the monks of an Arabian convent having first employed the decoction to prevent them from sleeping too sound, and neglecting their nocturnal prayers. About the middle, or towards the end, of the fifteenth century, coffee came to be generally made use of in those countries which profess the Mohammedan faith, although the use of it was, at first, strenuously opposed by their priests, and even by some of their princes.

From Arabia, the coffee-plant was transported, by the Dutch, to Batavia and Amsterdam, whence it found its way to France and to the French West Indies, and afterwards to the other American islands, where it is now propagated. It may be successfully cultivated in all tropical countries, and in those bordering on the tropics ; but is found to be produced of superior quality in some parts of Arabia, and especially in the neighborhood of Mocha.

Coffee forms the principal beverage of the inhabitants of the East, who are said to be in the habit of taking three or four ounces in the course of the day, without either milk or sugar, but perfumed with various spices. The Persians roast their coffee in the capsule which covers the berries, and grind the whole together. A decoction of the unroasted berries, is sometimes drunk by the Turks, for whetting the appetite. In France and other continental countries, it is much more used than in England, where tea is the more usual beverage. The Abbé Raynal informs us, that twelve millions and a half of pounds of this article are annually exported from Arabia alone, of which three millions and a half are bought by the different European countries.

[In the United States, coffee is more generally used than in England, it being here the common beverage for breakfast. Like tea, it is free of duty. In the year 1837,

* [Its botanical name is *Coffea Arabica.* It is a Cinchonaceous plant, belonging to the same family with the Peruvian barks.—Am. Ed.]

there were imported upwards of eighty-eight millions of pounds, by far the greater part of which came from Cuba and South America. Of this quantity, upwards of twelve millions of pounds were again exported. The whole value of the coffee was estimated at $8,657,760. If to this we add $5,901,695 for the tea, we have the total, $14,559,455, as the prime cost of these two articles for one year.] *

FIFTH WEEK—THURSDAY.

HUMAN FOOD.—SUGAR.

Of the vegetable productions of foreign countries, there is none of greater value, or held in greater estimation, than sugar.

This agreeable and nutritious substance, extracted from a plant belonging to the valuable family of the grasses, though manufactured, in the earliest times, in China and the East Indies, does not appear to have been much used by our European ancestors. It seems first to have become known to the western parts of the world, by the conquests of Alexander the Great, about three hundred years before the Christian era ; and it is supposed to have found its way into Europe, at an early period, by the Red Sea ; but the plant, from which it is extracted, is said by Lafitau to have been probably unknown in this quarter of the world, till the time of the crusades. Lucan, in speaking of Pompey's troops, describes, among his auxiliaries, a nation addicted to the use of sugar, as if this was an uncommon peculiarity.† From the East, the sugar-cane was transplanted first into the Islands of Rhodes and Malta, and then into Sicily, in which latter place it was cultivated, as far back, at least, as the middle of the twelfth

* This, and the paragraph on tea in the United States, are inserted by the Editor.

† Quique bibunt tenera dulces ab arundine succos. [Who drink the sweet juices of a tender reed.]

century.* From Sicily, the Spaniards are said to have conveyed the sugar-cane to the Azores, Madeira, the Canary and Cape Verd Islands, in the fifteenth century; and hence it is supposed to have found its way to the West Indies and Brazil. Some authors of credit, indeed, have maintained, that the sugar-cane is a native of America and its islands; but, whatever truth there may be in this, it certainly is found wild in the islands of the Pacific, where it was discovered by Captain Cook, and from whence the most valuable of all the varieties has been transferred to the sugar plantations of the West Indies.

A writer on the British Colonies thus ardently pronounces the eulogium of this useful production. "Sugar may be described, as comprising, in the most concentrated vegetable form, the principle or nutriment of life, *azote*,—a fact which admits of natural demonstration; for, not only do the inhabitants of every part of the globe delight in sugar, when obtainable, but all animated beings, the beasts of the field, the fowls of the air, insects, reptiles, and even fish have an exquisite enjoyment in the consumption of sweets, and a distaste to the contrary. In fact, sugar is the alimentary ingredient of every vegetable substance, encumbered with a greater or less proportion of bulky, innutritious matter. A small quantity of sugar will sustain life, and enable the animal frame to undergo corporeal (I may add mental, from personal experience) fatigue, better than any other substance. Often have I travelled with the Arab, over the burning desert, or with the wild Afric, through his romantic country, and, when wearied with fatigue and a noontide sun, we have sat ourselves beneath an umbrageous canopy; and I have shared with my companion his travelling provender,—a few small balls of sugar, mixed with spices, and hardened into a paste with flour. Invariably have I found two or three of these balls, and a draught of water, the best possible restorative, and even a stimulus to renewed exertion."†

* Lafitau records a gift of a mill for grinding sugar-canes, granted to the monastery of St. Bennet, in Sicily, in the year 1166.

† Martin's British Colonies, vol. ii. p. 427.

There is truth in this statement, but I suspect the observations are too indiscriminating. Some animals, have a decided aversion to sugar, in a concentrated state. This appears to be the case, for example, with the horse. I remember, at least, to have heard a much-valued friend mention an instance, illustrative of this, which happened to himself. He had a favorite horse, which he used frequently to regale with bread from his own hand. One day, on calling at the house of an acquaintance, he received, along with some refreshment, a piece of tea-bread, strongly sweetened, which, by way of experiment, he carried out to his horse. The animal took it, confidingly and without examination, into his mouth, and began to masticate it. Meanwhile, his master had thrown himself into the saddle, and was taking leave of his friends, when the horse, on perceiving the taste of the morsel he was eating, was seized with sudden fury, and shaking his head, while he grasped the bit fast between his teeth, rushed headlong, and at full speed, down a steep bank, and, in spite of his rider, found his way over hedge and ditch to a pool of water, where, instead of drinking, he literally rinsed his mouth, exhibiting, all the while, unequivocal symptoms of extreme loathing.

This natural dislike may be overcome by use. It is said, that in Cochin China, the horses, as well as buffaloes and elephants, are fattened with sugar; and there is no doubt that, in the West Indies, during crop-time, all the domestic animals, including horses, renew their plumpness and strength, by partaking of the refuse of the sugar-house. Mr. Martin, indeed, asserts, that he has "tamed the most savage and vicious horses with sugar."

During crop-time, the negroes themselves, although even more hard-worked then than at other times, become fat, healthy, and cheerful. "So palatable, salutary, and nourishing, is the juice of the cane," says Mr. Edwards, "that every individual of the animal creation, drinking freely of it, derives health and vigor from its use. The meager and sickly among the negroes, exhibit a surprising alteration, in a few weeks after the mill is set in action; in short," he adds, "on a well-regulated plantation, under

a humane and benevolent director, there is such an appearance, during crop-time, of health, plenty, and busy cheerfulness, as to soften, in a great measure, the hardships of slavery, and induce the spectator to hope, when the miseries of life are represented as insupportable, that they are sometimes exaggerated, through the medium of fancy."* He might have said, more truly, and more piously, that the benevolence of the Creator has implanted in the human mind such elasticity, and such natural resources for enjoyment, that even the worst condition cannot altogether crush the one, nor destroy the other.

It has already been observed, that sugar is found, in a greater or less proportion, very generally diffused throughout the vegetable creation. I have, in the 'Summer' volume, alluded to the attempt made in France to cultivate the beet, with the view of employing it in the manufacture of sugar; but there is another substitute for the cane, the production of a temperate region, whose properties entitle it to enter much more successfully into competition with it,—I mean, the maple-tree of America. This tree grows in great quantities in the western parts of all the middle states of America, and is also found in the northern states, and in the Canadas. In twenty years, it arrives at its full growth, and is then as tall as an oak, and from two to three feet in diameter. Cattle and sheep feed on the branches, in the winter season; and Dr. Rush supposes that it was this food, on which the domestic animals of the first settlers chiefly subsisted during that inclement season, before the cultivation of forage.

The maple-tree yields a copious sap, when the bark is wounded in spring. The usual way of collecting it, is by making a hole with an auger, and then inserting a spout formed of the sumach or elder, which is made to project some inches from the tree. A tree of an ordinary size will yield, in a good season, from twenty to thirty gallons of sap, which quantity produces from four to five pounds of sugar. The sugar is made from the sap either by freezing, by spontaneous evaporation, or by boiling;

* Edwards's History of the West Indies, vol. ii. p. 221, 222.

but the last is the most advantageous practice, for, when kept more than twenty-four hours without boiling, the sap becomes injured by exposure to the atmosphere.

Dr. Rush has earnestly recommended the manufacture of sugar from the maple-tree, as an article of commerce, and has given reasons to prove that it could be brought to market at a much cheaper rate than that produced by the sugar-cane. The peculiar taste of the maple-sugar, however, will probably prevent it from ever superseding the use of the latter, at least in countries where it is not produced.

I have already stated that the use of sugar, as an article of food, is believed to be highly salubrious. Sir John Pringle says, the plague was never known to visit any country where sugar composes a material part of the diet of the inhabitants. Drs. Rush, Cullen, and other eminent physicians, are of opinion, that the frequency of malignant fevers of all kinds, is lessened by the use of sugar. It is said to be an effectual remedy in the case of scurvy, and highly beneficial in various other diseases. But whatever may be its medicinal virtues, there can be no doubt that it is a most beneficent gift of Creative goodness, for which we cannot be sufficiently thankful.

It is painful to think, however, how frequently the perverseness of human beings converts the best gifts of Heaven into curses; and I cannot conclude this paper without remarking another means, by which man has contrived to render pernicious what was so admirably adapted to his benefit; I allude to the conversion of the refuse of the sugar into an intoxicating liquor, by means of fermentation and distillation. That this, and other intoxicating liquors, have their use in the system of creation, I am well aware; but, when taken to excess, they at once destroy the body and demoralize the mind; and no person, who reflects on the effects actually produced by them, will venture to deny, that the evils they have occasioned, by being abused by reckless and unprincipled creatures, unspeakably exceed any good effects which have attended them. The pious mind, in reflecting on the ways of Providence, will derive from this source a new evidence, both of the de-

pravity of the human heart, and of the system of discipline, so peculiar, and, to those who improve it, so salutary, to which it has pleased the Creator to subject the children of men.

FIFTH WEEK—FRIDAY.

HUMAN FOOD.—THE ENJOYMENT IT AFFORDS.

In considering the provisions of a bountiful Creator, relative to food, I must not omit to notice the enjoyment, which He has attached to the instinctive appetite. It may be truly said of this, as of other instincts, that its being attended with agreeable sensations, was not necessary, for the accomplishment of the specific end, which the Deity had in view, in bestowing it. A feeling of want, and a craving directed towards the object capable of supplying that want,—that is to say, the sense of hunger,—would have been quite sufficient for all the purposes connected with the repairing of the waste of the body, and the preservation of life, as well as for the fulfilment of various other intentions, already alluded to. That enjoyment in the use of the appetite should have been superadded, as it was not an essential, was clearly a benevolent provision.

Before examining the nature of this provision, it seems necessary to remark, that the abuse, to which the selfish indulgences of men have subjected it, has excited a prejudice, in many minds, against the pleasure itself. But the inference is false, as it is drawn from another law of our nature, the existence of which depends upon facts of a moral, and not a physical, kind. If gluttony and epicurism have been induced by the pleasures of the table, this is but an instance in which we have converted a gift of Heaven into a source of evil; and the folly and selfishness of man must not be brought to depreciate the bounties provided for his use. I have already remarked, that it is the ordinance of Providence, throughout all the

departments of Nature, that while the moderate and rational use of created things shall administer to the comfort and improvement of man, a profligate abuse of them shall degrade his nature, and shall defeat its own object by counteracting, in various ways, that pleasure which the sordid mind expects to derive from unrestrained indulgence. This is one of those provisions of the Divine administration, begun, but not fully developed on earth, by which, while virtue becomes its own reward, vice becomes its own punishment. We shall not, therefore, find it necessary to take it into account in the present inquiry.

On the nature of the pleasure derived from the taste and flavor of food, I need not dwell; and I shall only remark, that, while the taste depends on the organization of the tongue, the flavor is some way connected with the sense of smelling. That both exist in man, our own personal experience testifies; and we cannot doubt that the former, at least, exists also among the lower animals, and forms, indeed, the chief source of their enjoyment.

The adaptation of the external world to the gratification of this sense, is very remarkable. For the mere purpose of subsistence, a single vegetable esculent would have been sufficient, or, if more had for some cause been necessary, it was not necessary to vary the taste. The organ of this sense might have been so formed, that all substances, animal as well as vegetable, should have produced one uniform sensation when masticated for food. That this is not the case, arises from peculiar and obviously intentional contrivances, both in the edible substances, and in the organs of perception.

On running over in the mind, the various animals and vegetables which form the food of man, we find that every kind has its own distinctive taste, and that, generally speaking, there is a peculiar pleasure attached to the peculiar taste of each wholesome species. The very variety pleases; and although it be impossible to analyze the enjoyment, that there is enjoyment, is nevertheless the object of every person's consciousness. One might

expect that those animals, which feed on the same substances, would afford a similar taste ; and a corresponding effect might be supposed to be produced on vegetables growing on the same soil, or, at least, belonging to the same order. But this is very far from being the fact. It is, indeed, true, that we may classify tastes ; and this is itself a proof of the delicacy of the sense. There is one kind of taste of fish, another of flesh, and another of vegetables ; and under each of these classes there are distinct varieties ; the shellfish, for example, are distinguished from the finny tribes ; the fowl, from the quadruped ; the produce of the cereal plants, from the roots, and those again from pulse, from alliacious plants, [the onion tribe,] and from spices. Each of these classes, again, may be subdivided ; and under each subdivision, we shall find a taste belonging to every individual species. This enumeration points out a very remarkable variety in the objects of taste, and a delicacy not less remarkable in the organ by which the minute distinctions are perceived.

But there is another source of the enjoyment belonging to food, which arises from flavor. This is a principle still more mysterious than that of taste, of which chemistry can give no account, as it escapes all power of analysis. It seems to be almost peculiar to man, or, at all events, the lower animals are very differently affected by it, sometimes showing a total indifference, and at other times, but less frequently, a dislike to the flavor or odor which affords pleasure to human beings.

It is from flavor, that fruits derive their chief delicacy and attraction. Their discernible chemical qualities are very simple. These are nothing more, fundamentally, than a mixture of sugar and acid, differently proportioned, and more or less diluted with water and mucilage. "No power but the Highest," says Mr. Macculloch, speaking of flavor, "could have created what it passes human imagination to conceive, as well as human knowledge to assign ; and no wisdom but His could, through the addition of things imponderable, inseparable, unintelligible, have wrought out such a variety of ends."

"And has not all this superfluity," adds this talented and pious author, "so varied, so constant, so delicate, so difficult to understand, been appointed for us and for our pleasures? Has it not been appointed by Him, the powerful as the beneficent, when it is all the result of organization so minute and abstruse, and of chemical actions so obscure and so wonderful, that all equally eludes our faculties, and confounds our reasonings? Chance it is not, and it is not necessity; for all other animals it is purposeless; it is a source of enjoyment to us: And whence, then, again, in the words of Seneca, are the pleasures which we do enjoy, if God has not given them; if He did not thus provide for our happiness? Yes! Even in things so minute and so low as this; which we must not shun to think of, from false or affected views of Him, to whom man, altogether, is as the gnat of a day's life, equally under his care and protection, lest it should lack its food and its happiness, and fail in its generations. Between Him, the Infinite, and all beneath, all distances are alike. He watches, indeed, over the eternal welfare of man; but He also feeds the raven, and protects the sparrow. He has told us so: It is not impiety which strives to view Him in every thing; it is not piety nor religion that would exclude him from any thing."*

FIFTH WEEK—SATURDAY.

HUMAN FOOD.—COMPARISON BETWEEN THE FOOD OF SAVAGE AND CIVILIZED MAN.

THERE is this obviously intentional difference, between the articles produced by Nature for the lower animals, and those produced for man, that the former are scattered over the face of the earth in great abundance, without cultivation, and the latter are only scantily provided, and

* Vol. iii. chap. 46.

require the hand of art, for their propagation. The more we consider this difference, the more sensible we shall become of one great design of the Creator, to which I have already taken frequent occasion to allude, the exercise of the human faculties, by a necessity to labor and to invent. All those plants which now constitute the staff of man's life, are incapable of extensive propagation,—some of them, as would appear, are incapable even of preserving the species,—without the intervention of human art. This is particularly the case, in the temperate regions, with all the cereal tribes, and between the tropics, with the banana tree, which, in their respective localities, form the chief article of food. Without these, our race could scarcely subsist; as without our race, they would probably long ere now have perished.

As this arrangement was intended to promote and reward human industry, so there is another provision, not less essential for that purpose; which is, that industry, when exerted, should be crowned with abundant and varied success. To what extent this provision has actually been made, we shall best be able to discover by a comparison between the food within the reach of the savage, and that which loads the table of the man who lives in civilized society. He who subsists entirely on the natural productions of the forest and the waters, finds in the one but a few scanty fruits and roots, which he gathers, or a few wild animals, who fall victims to his snares; and, in the other, such limited varieties of the finny tribes as frequent his native river, or glide along the shores of his native sea. But observe what the toil and ingenuity of civilized man has effected. Not only has he appropriated and rendered abundant all the edible productions of his native soil, and greatly ameliorated them by culture; but, not content with this, he has bridged the ocean, and collected from the most distant lands, whatever was found capable of nourishing his body, or gratifying his appetite.

If we look into the lowly cottage of a British peasant, and examine the fare of the inmates, comparatively ill provided though they be, we shall find that they are almost

entirely indebted, either directly or indirectly, to foreign climates, for the articles on which they subsist. The corn,—whether oats, barley, rye, or wheat,—from which their bread is prepared, wherever it originated, was certainly not indigenous; the milk with which they moisten it, is the produce of an animal, which is probably not a native of their island, and has, at all events, been tamed and domesticated, before it would afford them this delicious beverage; their potatoes have found their way to them from the distant regions of the Andes, in the western world; their peas and beans from the scarcely less distant countries of the East, to which prolific soil they probably also owe their turnips, their cabbages, and their onions. These, however, though originally imported, are all now the produce of their own soil; but it is not so with some other productions, which have ceased to be luxuries, and have become comforts, if not necessaries, even to the laboring classes. To bring them tea, half the globe has been encircled; to produce them sugar, the poor Negro has toiled under a tropical sun. If their perverted habits lead them to indulge in tobacco, in any of its forms, the indulgence is wafted to them across the broad Atlantic.

When we turn to the tables of the rich, we find all the varieties of food, already mentioned, and many more. Of their numerous vegetables, few are indigenous to Britain. The Jerusalem artichoke is a native of Brazil, the spinach of Asia, the endive of Japan, the scorzonera of Spain; pepper is a production of tropical climates; beet and celery of the European continent. They first imported cauliflower and the garden-cress from the island of Cyprus; asparagus was early cultivated in Greece; and the artichoke and lettuce seem to owe their origin to a similar locality on the shores of the Mediterranean. Rice and millet are the produce of tropical grasses; arrowroot is extracted from the root, and sago from the pith, of plants which flourish only under the rays of a burning sun. The animal food used by them is also indebted for some of its varieties to foreign importation. The cow, which furnishes their beef, and the hog, which supplies them with pork and ham, may be native animals; but it is not so

with the sheep, which provides them with mutton, and adds, by its delicacy and flavor, so much to the luxuries of the table. This has been transported from the teeming East, and has proved, from the earliest times, one of the most important gifts of the Creator to the human race, whether we consider its uses while alive, or after it has fallen under the butcher's knife.

The luxuries of the dessert, are equally varied, by the productions of foreign lands. The apple, the pear, the quince, and the medlar, are all acquisitions from the Eastern continent; and the same may be said of the pomegranate, the fig, and the grape. To an Eastern region, also, the English are indebted for their cucumbers and melons; while the peach, the nectarine, the almond, and the apricot, are importations from the same primeval garden. The olive is a native of Asia and Africa, and perhaps also of the southeastern parts of Europe; and the orange, though now cultivated in almost all warm climates, seems to have originally sprung from the tropical regions of the East. Of preserves, the tamarind and the guava are the produce of either India. Of exhilarating infusions, coffee, as well as tea, is raised under the influence of a warmer climate; and when we add to all these luxuries, the fermented juice of the grape, we enumerate the chief of a long list of productions and preparations, remarkable at once for their variety and for their agreeable qualities, which have been procured by the industry and enterprise of civilization.

Many of these productions have been naturalized in Britain, and also in the United States, and have thus increased the range of our vegetable stores, while they have added, most materially, to the powers of our soil and climate in maintaining human life. But where this could not be effected, commerce has accomplished whatever else was necessary for extending the varieties of human enjoyment; and from all climates, and all regions, the exuberance and diversified produce of Nature, are poured into our happy land.

Such is the effect of that salutary discipline, under which the necessity of procuring food from the vegetable

stores of the earth, and its animal produce, has placed the mind of man. There is no end to the race of improvement, under the urgency of natural and artificial wants, and the variety of Nature's enticements. In looking back on the progress we have made, we cannot but wonder at our present advanced position; and while this encourages us to look forward with hope to the future, it reminds us, at the same time, of the Unseen Hand which has led us hitherto, and confirms all the conclusions which, in the course of our investigations, we have formed relative to the profound and benevolent system of Providence, in the conduct of human affairs.

SIXTH WEEK—SUNDAY.

"GIVE US THIS DAY OUR DAILY BREAD."

THERE is something peculiar in the petition which I have chosen as the motto of this paper. We are not invited to pray for riches or honors, but for *bread*,—for necessary food. The prayer is similar to that of Agur, "Feed me with food convenient for me."* In every thing beyond this, there is a snare; and he who knows enough of his own weakness, to have a salutary distrust of himself, will be moderate in his desire to obtain an abundance of the good things that perish in the using. His wish and aim will be, to be raised above the temptations of want; but it will not be without diffidence and caution that he seeks for more.

Nothing can show a truer or wiser estimate of earthly possessions than the rest of Agur's petition. "Give me neither poverty nor riches; . . . . . lest I be full, and deny thee, and say, Who is the Lord? or lest I be poor and steal, and take the name of my God in vain." It is, however, in the spirit, not in the letter of the prayer, that this

* Proverbs xxx. 8.

wisdom is to be found. In the medium between poverty and riches, there is the greatest safety. But this should not deter us from prosecuting, with diligence, the secular avocations of the profession in which we are engaged, or of the station which we occupy. If it please Providence to crown our labors or our skill with superfluities, it would be both folly and impiety to reject them. But, then, this enlargement of our means of usefulness, as it is accompanied with an increased responsibility, implies, also, greater danger of defect and of abuse. It ought, therefore, to place us more on the alert, causing us to be more vigilant in guarding our hearts against the temptations which multiply around us, and more assiduous in occupying the additional talents which our Divine Master has committed to our charge.

Moderation in our desires is, therefore, not only a duty but a privilege. We were placed in this world, not to "eat, drink, and be merry," and then to die. We have a far higher duty than to indulge our appetites. We must make it "our meat and drink to do the will of our heavenly Father." This is the chief object of the Christian's pursuit; and if we pray for an increase of our worldly store, it must not be with a view of employing it as an end, but as a means of accomplishing the important work assigned us.

Another duty which this simple, but most emphatic petition, suggests to us, is, that of a continual reliance on God for every blessing. We are only taught to pray for *daily* bread; not for what would render us independent of the constant supplies of his bounty. To feel that we were independent of God, would be no blessing, but the very reverse. An affectionate child, sensible of his own want of knowledge and wisdom, is delighted to derive support from an intelligent and bountiful father. The parental kindness, with which it is bestowed, enhances the value of the gift; and the same feeling is excited in the heart of the Christian, in relation to his heavenly Father.

But there is one thing, which may doubtless distress a child under a sense of dependence on an earthly parent.

He may fear that his affectionate provider subjects himself to privation on his account; that he either toils too hard, or stints himself of some convenience or comfort, to supply his wants, or contribute to his welfare or enjoyment. This sentiment cannot enter into the consideration of the Christian in reference to God. *He* has an abundant store of blessings to bestow, which can never be exhausted; and He giveth to all liberally, and upbraideth not. To depend on Him, therefore, is enjoyment without alloy. He invites us to ask, and withholds no good thing from the humble petitioner. He is equally able and willing to bless us, and the only limit to his bounty is our own perverseness or indifference.

But, for every good thing, our heavenly Father requires that we should petition Him, because it is of importance to our moral condition. Prayer is the most becoming position, in which an intelligent creature can place himself, in regard to his Creator. A desire of being independent of God, can only arise from some improper motive. To feel accountable, is irksome to some, because they are too proud willingly to acknowledge a superior; and to others, because their inclinations are unholy and sinful, and they dread the punishment due to their disobedience. Neither of these characters "like to retain God in their knowledge." They do not profess to shake off their allegiance, because they know that the attempt would be madness; yet they do what practically amounts to the same thing. They banish God from their thoughts. So far from delighting to ask the Divine blessing on their ordinary occupations, they never once reflect on his presence and superintending providence. They are, on the contrary, pleased to think, that, whatever attainments they have made, either in wealth or in mental improvement, is the result of their own ingenuity and industry. It would mortify them to give the glory to God. They may readily enough do this in words, but this is nothing more than a homage of the lips, to which the heart does not cordially assent.

It is very different with the servant of Christ. To depend on God, is his glory and joy. He feels that this

is the highest dignity of his nature,—his most delightful privilege. He would not be independent of God, if he could. Filial love is the cherished sentiment of his heart; and every thing acquires a new relish and deeper interest, when viewed as the gift of paternal bounty. Thus he rejoices to cast himself daily on the Divine protection, and to feel himself continually cherished in a Father's bosom, and surrounded with a Father's arms.

We are told, that we must become "like little children," before we can be fit subjects of the kingdom of heaven; and, assuredly, there is no respect in which the feelings of a child are more becoming, than a sense of constant reliance on a parent's care. Look at an infant in his mother's arms. How content, how happy is he in his dependence! Delightful experience has taught him, that there is an eye watching over him for good, that there is a heart yearning for his happiness, that there is a hand which assiduously supplies his wants, and provides for his comfort, and anticipates his wishes. All this, he even feels instinctively; and he is, therefore, no where so happy as in the sunshine of his mother's smile. When she is absent, he mourns; when her fond eye meets his, he laughs for joy; on her bosom, he sinks sweetly to repose, soothed with her wellknown lullaby. He has no care, because she cares for him; in her affection, her wisdom, her power, he relies with assured confidence and tender love. To be thus dependent, is a source of the sweetest delight.

This is the very sentiment which becomes a Christian, but it is exalted and refined by his own matured intelligence, and by the infinite perfections of the Divine Being on whom his dependence rests. Experience has taught him, that he is perverse and rebellious; and he the more admires that long-suffering compassion, which waits to be gracious to him. He has read, in the book of Revelation, of the wonders of redeeming love, and the whole faculties of his soul are kindled, and burst into a flame of gratitude and adoration.

SIXTH WEEK—MONDAY.

AGRICULTURE OF THE GREEKS.—THEIR HARVEST.

BEFORE leaving the subject of human food, it seems desirable that some notice should be taken of its history, as connected with the progress of agriculture. That art by which the earth is beautified and made fruitful, and on which the sustenance of man mainly depends, must have recommended itself to the care, and called forth the pious gratitude of nations, even in their first stages of civilization. Accordingly, we find agriculture invested with a sort of sacred character, by the most renowned nations of antiquity. The Egyptians, the Greeks, and the Romans, regarded as a religious duty, as well as an honorable employment, that earliest and most innocent of the arts.

The ancient Greeks, to whose agricultural skill I shall in this paper confine myself, made considerable progress in both the theory and practice of this art. Their agricultural literature, were it all extant, would of itself nearly fill a library. Varro mentions by name about fifty Greek writers on agriculture, among whom occur some of the brightest ornaments of ancient literature and science.* It is to be regretted that the treatises of almost all have perished; for we have doubtless lost, with these, much curious information, on the ancient history of agriculture, if not also rules and processes which might be highly useful at the present day.

Of these writers, the oldest, perhaps, is the poet Hesiod, whose agricultural poem, entitled the 'Works and Days,' has been preserved to us, though, we fear, only in a fragmentary state. It furnishes some curious information, as to the state of Greek agriculture, in early times, and presents us with some lively pictures of ancient rural

* De Re Rus. lib. i. cap. i.—The authenticity of his catalogue is enhanced by his distinguishing between those whose native place was known, and those of unknown extraction; reckoning about thirty-four of the former and fifteen of the latter.

manners. The Greeks, according to the Ascræan bard, were in the habit of ploughing their land twice, or even thrice, before sowing it ;* once, in spring, often a second time, during the summer, and always once more, in September and October, their usual seed-time. It was a general practice, to let a field that had been cropped, lie fallow, during the following summer : sometimes, also, it was allowed to remain unsown, and exposed to the pulverizing frosts of winter.

The Greeks appear to have had no instrument like our harrow ; but a person followed the sower with a spade or rake, and laboriously covered up the seed.† When the operation of sowing was once over, the progress of the forth-coming crop was watched with great anxiety ; and every thing was done, that experience or superstition prompted, to defend it, from disease and all external injuries. Harvest usually commenced about midsummer, or even earlier, and was completed before the vintage began. The chief reaping instrument employed, was a serrated, or teethed hook. A train of slaves, or hired laborers, each armed with his rustic implement, and under the direction of a master, or overseer, cut the stalks by the middle, and collected them into sheaves, or simply cut off the ears, and threw them into wicker baskets. Early in the summer morning, before the burning heat of the day, the reaper train commenced their joyous labors, and ere the sun had mounted high in the heavens, the heaviest part of their day's work was done. Hesiod thus addresses the husbandman, when harvest-time is come :

> " Whet the keen sickle, hasten every swain,
> From shady booths, from morning sleep refrain ;
> Now, in the fervor of the harvest day,
> When the strong sun dissolves the frame away :
> Now haste a-field ; now bind thy sheafy corn,
> And earn thy bread, by rising with the morn."‡

* Pliny the younger, in one of his letters, states, that stubborn soils were sometimes ploughed as often as nine times, before they were thought sufficiently subdued to receive the seed. But the imperfection of the ancient implements, may partly account for this necessity.

† Hesiod Op. et Dies, 471, &c. ‡ Ibid. 573—575, Elton's trans.

When the harvest was gathered in, the Greek husbandman presented offerings to Ceres, crowned her with a spiky garland, and by many solemn rites expressed his superstitious gratitude. He and his household gave way to the joyousness of the season, and revelled in its newest bounties. Seated in a shady grot, enjoying the zephyr and the cool fountain, with his feast of milk and goats' flesh spread before him, and quaffing the dark Byblian wine, mixed with water, he solaced himself after his harvest toils with these the simpler luxuries of Nature,* while, by his libations and offerings, he set an example of gratitude to the God of the seasons, which more enlightened tillers of the soil would do well to imitate. In the most primitive times, and among the rudest tribes, we find man giving way to the gratitude of his heart for the rich supplies of Autumn. Shall we then receive the annual stores of the teeming earth without acknowledging, and gratefully rejoicing in the unceasing bounty of Him who is the Giver of them all ? J. D

* Op. et Dies, 589—596. There is a severe beauty in Hesiod's description of the husbandman's after-harvest feast, which can only be appreciated in the original. Yet I gladly subjoin Elton's translation, which, on the whole, is vigorous and faithful.

"Oh then be thine
To sit in shade of rocks ; with Byblian wine,
And goats' milk, stinted from the kid, to slake
Thy thirst, and eat the shepherd's creamy cake ;
The flesh of new-dropt kids, and youngling cows,
That, never-teeming, cropp'd the forest browse :
With dainty food to saturate thy soul,
And drink the wine, dark-mantling in the bowl :
While, in the cool and breezy gloom, reclined,
Thy face is turned to catch the breathing wind ;
And feel the freshening brook, whose living stream
Glides at thy foot, with clear and sparkling gleam :
Three parts, its waters in thy cup should flow,
The fourth, with brimming wine may mingled glow."

The Byblian wine, so named from a district of Thrace, was thin, and not intoxicating. This, with some other points, gives an air of frugality and temperance to this finely-painted scene of rustic enjoyment.

SIXTH WEEK—TUESDAY.

AGRICULTURE OF THE ROMANS.—THEIR HARVEST.

If the Romans were distinguished by their passion for war, and by the military cast of their institutions, they were no less remarkable for the attention they paid to agriculture, and for the respect in which they held the husbandman. In the early and best days of their republic, the plough was venerated; and often was it followed by consuls and laurelled commanders.* While commerce, with its subsidiary arts, was despised, the cultivation of the soil was thought in every respect worthy of Roman dignity; and hands, that one day, swayed the rod of empire, on the next, were guiding the plough, in some suburban farm. We see a Cincinnatus, and a Fabricius, notwithstanding their warlike glory, devoted to agriculture, as if it were the great business of their lives; and a Cato, testifying his love of that noblest of the arts, by writing an elaborate treatise on rustic affairs.† "From husbandmen," says that last-mentioned true Roman, "spring our strongest men and bravest soldiers; theirs is the most certain, the most honest, and the least invidious gain; and they are also the best affected members of the state."‡ He also says that, in the early times of Rome, to be pronounced a good husbandman, was reckoned the highest praise of a citizen. According to Pliny, to cultivate his farm ill, was a crime for which the Roman was answerable to the censor.§ Agriculture, says Columella, is nearly related, and, as it were, akin to wisdom. Thus not only the civil and political

* Ipsorum tunc manibus imperatorum colebantur agri; ut fas est credere, gaudente terra vomere laureato et triumphali aratore. [Then were the fields cultivated by the hands of commanders themselves; the earth rejoicing, as we may well believe, in the laurelled plough, and the victor ploughman.]—*Plin. Nat. Hist.* lib. xviii. 4.

† The only book extant of Cato's work, is enough to make us regret the loss of the rest.

‡ De Re Rus. lib. i. c. 1.

§ Nat. Hist. xviii. 3.

effects of agriculture were thought highly of by the ancient Romans; but, as was most becoming, its moral influence was duly prized and cherished. The very name of husbandman, or colonist, was by them associated with all the simple and rustic virtues; while they considered a city life equally unfavorable to the moral and physical powers.

I do not here introduce any sketch of ancient Roman agriculture, though abundant and very interesting materials exist, in the works of Cato, Columella, Varro, and other writers on rural subjects, not omitting the elegant Virgil, of whom it has been said, that he tosses about even his dung, with dignity. A brief account of their harvest, however, will not be deemed out of place, at this season.

Among the Romans, the reaping of wheat and barley began in June. The stalks of the ripe corn were cut by the middle, as among the Greeks, or pulled up by the roots; or the ears only were cut off, and the entire straw left standing. A sickle was the instrument usually employed. The grain was either immediately carried to the barn or threshing-floor, in baskets, or was left, fully to ripen and grow plump, as was thought, in the sheaf. Pliny, and Palladius, have each described a sort of reaping car, used in Gaul, which was mounted on two wheels, and set thickly round with rows of iron teeth, elevated according to the height of the corn. When steadily pushed along the field, by an ox trained to the work, the ears were caught by the projecting teeth, and fell into the middle of the machine. This instrument, however, does not appear to have ever come into very general use, and the account of it is chiefly curious, as showing that the mechanical genius of the ancients, as well as of the moderns, was turned in that direction.

In most of the Italian provinces, reaping with the hand appears to have been exclusively practised; but the modes were greatly diversified. The Umbrian reaper, cut the corn close by the ground, deposited his handfuls on the stubble, and afterwards, at his leisure, severed the ears from the straw; but the Picenian, with his saw-like sickle, contented himself with cutting off the ears, leav-

ing the stalks standing on the field.* In the neighborhood of Rome, again, the mode of reaping, closely resembled our own.

The operation of threshing was an awkward and laborious one, as indeed it always was, even in the most civilized countries, before the invention of the threshing machine. A kind of heavy vehicle was repeatedly rolled or dragged over the corn, when spread out on the area; or cattle were driven over it, to crush out the grain with their hoofs; or, lastly, sticks were used to beat it out, after the fashion of our flails. The threshed grain was carried out to an exposed hill, where the wind might perform the office of fanners; or, failing the expected breeze, large fans were employed to disperse the chaff. But anxiously did the husbandman wait for the west wind, whose gentle and agreeable blast was highly favorable for his winnowing operation.†

On the consummation of the farmer's hopes and labors at the end of harvest, a general joy reigned in the fields, sacrifices of corn and fruits were offered to Ceres, and garlands of ripened ears were heaped upon her statue, or shrine. Superstition even owned a Vacuna,—a goddess of leisure,—who was not forgotten at this period of abundance and repose. The rural lord now collected his slaves and hired laborers, and held his harvest-home. Saturnalian license was, for at least one night, allowed the wearied reapers, and they were made to feel the rich plenty of the season. Hospinian thinks, that the celebration of the finished harvest, almost universal among the heathen, was borrowed from the Jewish feast of in-gathering; but, however this may be, we may safely affirm, that the gifts of autumn naturally produce in the heart emotions of gratitude and gladness, which always tend to manifest themselves outwardly, in offerings or thanksgivings to some superior power. Such natural emotions we ought to cherish, and turn to practical account; for, if the heathen, in their superstition, devoutly thanked an imaginary Ceres, or Flora, or Pomona, for the fruits and flowers of the earth, how

* Varro, lib. i. cap. 49. † Colum. lib. ii. cap. 21.

ungrateful are we, if, at this joyous season of the year, we thank not the God of harvests, for his overflowing bounty, and if the measure of our gratitude exceed not that of the ancient Greeks and Romans, as much as our light is superior to theirs.

We may justly reckon, among the adaptations of the material world to man's moral nature, its capacity to call forth sentiments of joy and gratitude. The exuberance with which Nature for him pours forth her stores, at the period immediately preceding the privations and sterility of winter, is sufficiently remarkable; but independent of this, the arrangement by which one season excels all the rest, is calculated to produce a salutary influence over his heart. This laborious cultivation of the ground is not only useful in rousing him to industry, and crowning him with all its blessings, but its annual results, so rich and so abundant, are well fitted, we may say benevolently designed, to raise his thoughts from autumn, and its bountiful stores, to the God of seasons, who in his goodness feedeth man and beast, and sendeth his rain upon the just and the unjust. J. D.

SIXTH WEEK—WEDNESDAY.

PROGRESS OF BRITISH AGRICULTURE.

So much has already been said, in a previous volume, on the present state of British agriculture, that I shall not recur to particulars, and shall content myself with a hasty sketch of its progressive improvement, and the circumstances by which it was affected.

When the Romans first invaded that distant island, about half a century before the birth of our Saviour, the inhabitants had made but small advances beyond the pastoral state. Their conquerors gave them the knowledge of agriculture, and of other arts of civilized life; but the calamities of internal warfare and foreign aggression, long retarded their progress. Though slow, however, their

advancement was certain. They had acquired a taste for the conveniences of life, which could not fail to urge them forward. The first steps in improvement, are, perhaps, the most difficult and tardy; but, after the movement is begun, its own impetus impels society forward in a constantly increasing ratio. Desire was awakened, and the hope of its gratification gave rise to industry; healthful toil strengthened the bodily powers; forethought and invention afforded expansion to the mental faculties. A genial soil and climate favored the natural progress. As the resources of the inhabitants increased, their wants increased also. Ease and comfort, during intervals of peace, swelled the amount of the inhabitants, and augmenting possessions required an augmented number of dependants; while a denser population made new demands on industry, and opened new fields for the exertion of ingenuity.

This progress, which is, in fact, no other than the natural history of society, in every country advancing from a savage to a civilized state, was practically exemplified in the southern division of the kingdom, particularly during the period which intervened from the time of the Norman conquest to the consolidation of the state in the days of the Eighth Henry, and his immediate successors. Much interruption, indeed, had been given to this advancement, by the intestine divisions arising from the disputed titles of the powerful families of York and Lancaster. But, in some respects, these very divisions proved ultimately advantageous. During the alternate successes of the contending parties, the power of the great barons was repressed; and the reduction of the aristocracy gave consequence to the middle classes, and made room for the establishment of a more efficient police, and a more equal administration of justice. Private property came thus to be more secure. The power of the Crown, which had become so formidable to the nobles, was exerted for the protection and advancement of the people,—such was the policy of the day,—and agriculture flourished, as soon as rival chiefs ceased to live with impunity on lawless plunder.

With the improvement of agriculture, arose the desire

for comforts and luxuries, and a taste was acquired for the productions of foreign climes. Hence the origin of that commercial enterprise, which, since the days of Elizabeth, has been the remarkable characteristic of the British nation. The spirit thus introduced was doubtless increased and directed by the industrious manufacturing and trading emigrants from the Low Countries, whom bigotry and oppression had driven to take shelter in a happier land; while the facilities which an insular situation afforded, rendered that spirit permanent.

The effects of commerce, in giving a stimulus to agriculture, were various and important. The increase of the population in towns, which was the immediate consequence of mercantile employments, opened new markets for agricultural produce; the variety of unknown luxuries and conveniences, which an intercourse with foreign lands introduced, excited a longing to possess; and this, again, urged forward the progress of industry; new views were cherished, and a wider field was presented for exertion; and so the excitement proceeded till commerce came to be rivalled by manufactures, and manufactures, again, reacted on commerce and agriculture; and thus a constant excitement was kept up, which has given to Britain that industrious and enlightened population, whose distinguishing characteristics are exhibited by a kindred nation in the western world, which is even now emulating its parent in power and prosperity.

This progress, so rapidly sketched, was greatly facilitated by various circumstances, which strikingly mark the hand of a favoring Providence. The emancipation of men's minds from the debasing yoke of Papal dominion; the spirit of freedom which sprang up with the Reformation, and to which the peculiarities attending an insular condition gave free scope; the union, first of the crowns and afterwards of the kingdoms, which put an end to intestine wars; the genius of the government; the enterprise of merchants and agriculturists; the inventive powers of a Watt, an Arkwright, and a Wedgewood, seconded by the resources of a population growing in intelligence, in wealth, and in activity;—all these circumstances, and

many more which might be enumerated, combined to raise Great Britain to the eminence in which she now stands.

With what salutary influence have Nature and Art been made to combine, and even sometimes to oppose each other, for the benefit of man! Let it be remembered, that, if the earth had yielded her treasures spontaneously, there would have been no call for the exercise of industry and talent, in providing the means of subsistence; and if, on the contrary, she had been much more niggardly of her gifts, the love of improvement would have been overcome by the difficulty of the enterprise. As it is, the coyness of Nature excites desire; while the facility with which she yields, when vigorously attacked, gives energy to hope, leading from one attainment to another, and, with every new instance of success, affording additional incitement to exertion. So wonderful is the discipline by which, under an overruling Providence, the powers of the human mind are called into action!

SIXTH WEEK—THURSDAY.

MODERN CONTINENTAL AGRICULTURE.

AGRICULTURE on the Continent is undergoing gradual but steady improvement; yet, notwithstanding the superior salubrity of the climate, and, in many districts, of the soil also, the produce, acre for acre, is much inferior to that of Britain. With regard to France, it appears, from a work of M. Chaptal,* that landed property, in that country, was formerly possessed by three classes of proprietors,—usufructuaries, who had no interest in improving it; great proprietors, who lived at court, and paid no attention to their immense domains; and laborers, who had not the means of extensive farming. But the whole system was changed by the Revolution, and the number

*'De l'Industrie Francaise.'

of proprietors has been nearly doubled within the last thirty years. This change must eventually produce an immense improvement in the produce of that country, and has already given rise to very considerable effects. The present inferiority, however, in the cultivation of the soil, to that of Great Britain, is still very great, and the following result has been deduced from an examination of the subject, in an able article of the 'Edinburgh Review,' for 1819, namely, that the ratio of produce between England and France is as ten to nineteen, and from equal surfaces as five to four,—that is to say, an excess in favor of England from equal surfaces of twenty per cent. "Now," adds the reviewer, "this is the ratio not of value, but of absolute quantity, and must be entirely attributed to our superior agricultural skill, which, notwithstanding the disadvantages of climate, makes four superficial measures of English soil yield as much in quantity, as five of the same measures of French soil."

The proportion of waste grounds in France is smaller than in England; but the art of cultivation is less understood; its processes are less enlightened, and less of principle presides over its practices. The French peasant is particularly ignorant; and even in the higher order of cultivators, there is little agricultural spirit. The fertility of the soil has served as a bar to improvement, by making laborious methods of cultivation less necessary; and the serenity of the climate saves the farmer from the exercise of his ingenuity, in providing against the inclemency of the weather, and the uncertainty of the seasons. "They rest with confidence," says the reviewer, "upon the bounty of Nature, that has prepared for them every advantage except an incitement to thought, and a motive for provident reflection." There is much truth, undoubtedly, in this observation; but we must go deeper into the subject before we shall be able to account for the extraordinary disparity in question. It is by no means wonderful that the disadvantages of an ill-constituted state of society before the Revolution, and the commotions which attended and followed it, should have themselves operated powerfully in retarding improvement, and depressing cul-

tivation, while it deeply influenced the moral character of the inhabitants.

The improvements which have taken place in French agriculture, within the last thirty years, are, according to M. Chaptal, principally, 1st, The cultivation of the potato, which the poor formerly disdained, but which has now found its way to the tables of the rich; 2d, The introduction of beet root; and 3d, The introduction of merinoes.

The only branch of agriculture, in which the French surpass the rest of Europe, is the cultivation of the vine; and to this, they owe the excellence of their wines. France is situated, with regard to the vine, in the position which is most favorable for the developement of industry; because its cultivation is attended with considerable difficulties, which call forth care and ingenuity, and which readily yield to these means when properly applied. The frosts of the spring, the rains and cold of the later season, and the accidents which threaten, in a climate not every year mild and steady enough to bring to full maturity a plant indigenous to warmer regions, stimulate the husbandman to search out the best methods of giving it vigor and protection. It is remarkable, that in Spain, Italy, and Hungary, where Nature is more genial, industry is less powerfully excited, and hence the produce is inferior; exemplifying, in a comparison between France and these countries, a species of superiority, which, as we have already seen, belongs to Britain, when compared with France in other kinds of cultivation. In both instances, we find reason to remark the wisdom of the providential provision, which has refused an abundant produce to man, except as the reward of skill and industry.

The only other continental country, the present agricultural state of which seems, in this rapid glance, to require any particular notice, is Italy. There are some circumstances, which render every thing regarding that country peculiarly attractive. Its ancient fame in arts and arms; its commanding influence during the middle ages, and not less its present feebleness and depression,—all claim our attention and our interest. Nor can we fail,

in contemplating its present agricultural state, to cast our eyes back, with mixed emotions, on those former days of its glory, when the cultivation of the soil, formed the pride and the enjoyment of its most prominent statesmen and warriors.

Italy, in its agricultural character, has been divided into three regions; the first, comprising the great plain traversed by the Po, bounded by the Alps on the west and north, by the Appenines on the south, and by the Adriatic on the east, to which the general name of Lombardy may be given; the second, extending on the south declivity of the Appenines, from the frontier of France, to the borders of Calabria, which comprehends the Tuscan provinces; the third, containing those pastoral regions which take the designation of the Maremma, from their neighborhood to the seacoast.

The Lombardy division is one of the most prolific in the world. The soil is a rich alluvial mould, mixed with gravel in the neighborhood of the mountains, and reaches to an unknown depth. The great lakes at the foot of the Alps, serve as reservoirs, from which, and from the rivers which they feed, canals for irrigation are cut on a regular system, skilfully contrived to distribute the water over the surface of the ground. By this means, the natural fertility is prodigiously increased, and an immense population is supported. In the country between Cremona and Lodi, the culture of corn gives place, in a great measure, to pasture. It is the richest part of the Milanese. The grass is chiefly clover, which is cut four times a year, and serves for the food of cows, from which is produced the cheese so well known over all Europe by the name of Parmesan. To make this cheese, the milk of at least fifty cows is necessary; and when one farm does not supply so large a quantity, the farmers unite in societies for the purpose. When the land has lain in grass, for fourteen years, the crop of clover begins to fail, and the ground is ploughed up; after which, for five years, a regular succession of crops takes place; consisting, the first year, of hemp, followed by leguminous plants; the second, of oats; the third, of wheat, followed

by legumes; the fourth, of maize; and the fifth, of wheat. The ground is then left to itself, and is immediately covered with herbage. The simple enumeration of this kind of rotation is sufficient to indicate the remarkable fertility of the soil. I may add, that no manure is applied while the land is under the plough; but that, while it lies in grass, it receives a top-dressing every three years.

The Tuscan territory resembles, in many particulars, that of Lombardy; and the system of irrigation is carried on here also with equal regularity on the low grounds, while, on those elevations, which rise above the reach of the water, vines and olives are cultivated with great success. This country is watered by the Arno, and is said, by M. Chateauvieux, to be the most delicious, perhaps, on the face of the earth. "There is not a single spot remaining of natural turf," says this author, "nor a meadow, where the husbandman, in collecting the produce, receives only the spontaneous gifts of Nature. We do not find a single thicket of natural wood, or a tree planted by the hand of Nature. All is planted out and dressed by the hand of man. His presence and his works are seen every where; and it is only in the hills, which bound the horizon, that you discover a portion of those great dominions, over which Nature still preserves her empire."

Amidst all this profusion and beauty of the vegetable world, however, it is distressing to think, that the cultivators of the soil are in a state of abject poverty. M. Sismondi, who mentions this fact, accounts for it from the unjust and impolitic exactions of the landowners, who have neither sympathy with the lower orders, nor sufficient enlargement of mind, to perceive that a more liberal system would insure their own ultimate advantage.

The third agricultural division of Italy, differs most materially from the other two, in its being affected with a strange and unaccountable taint in the atmosphere, called *malaria*, which renders it unfit for the permanent habitation of human beings. This singular tract, extends along the shore of the Mediterranean, from Leghorn to Terracina, and reaches inland, as far as the first chain of the Appenines. Its length is therefore two hundred and ninety-

two geographical miles, and its breadth, in the Agro-Romana, where it is greatest, between thirty and forty of those miles. The disease, to which this malignant influence gives rise, and which attacks the inhabitants in summer and autumn, is an intermittent, or an ague of the worst kind; not, however, arising from the miasmata of marshes, or other known causes of a similar disorder, since the greater number of places, where it prevails, are dry, airy, and elevated.

This dreadful visitation is said, by the Italian writers, to have made its first appearance, contemporaneously with the plague in the sixteenth century, since which time, it has been gradually increasing in extent and inveteracy. That large tract of country which was once so populous and flourishing, has now become a wilderness, in which are to be found scarcely any human inhabitants except a race of wandering shepherds, possessing nothing but their cattle, and emigrating with them, according to the seasons, from the hilly to the level country.

The cause of this infliction is still a mystery, and there are no indications of its presence in external nature. "The sky," says Chateauvieux, "is as pure, the verdure as fresh, the air as tranquil, as in the most healthy region. The aspect of all the elements is such as should inspire the most perfect confidence; and it is impossible to express the horror which one experiences on discovering that this is all deception, that he is in the midst of dangers marked by no sign, and that, with the soft air he is breathing, he may be inhaling a poison which is to destroy him."

This invisible pest seems to be of a nature to increase itself, as it is said to become more malignant in proportion as the country becomes more depopulated. If this be true, there would appear to be no assignable limit to its ravages save the mountains or the sea. It is certain, at least, that it has been steadily progressive in its influence, and has already even invested the 'Eternal City,' as Rome has been proudly but falsely called, and has found its way within the very walls.

SIXTH WEEK—FRIDAY.

CLOTHING.—ITS PRINCIPLE.

THE necessity or comfort of procuring a covering to the body, from the vicissitudes of the weather, is the second principle formerly alluded to, by which the Creator calls forth and exercises the faculties of his rational creatures, and forms a new division of the subject. Every other inhabitant of the earth, above the grade of insects, which are governed by laws of their own, comes into the world with some contrivance in the shape of clothing, beautifully adapted to its nature, and generally altering with the season of the year, so as more effectually to guard its body from the injurious effects of the heat or the cold which prevails. But man is destined to procure his own clothing; and this, which at first sight appears a defect, is in reality the source of many blessings.

The human race were to be diffused over the whole habitable earth, to be inhabitants of all climates, and of all localities. Their clothing, had it pleased the Creator to afford them a natural cover, would have required to be so constituted, as to change with the peculiar situation in which they were placed, so as to serve as a protection, at one time, from the burning heats of the tropics, and at another, from the chilling breath of the polar skies. This might, indeed, have been effected, and would have only been a further extension of the law which exists among the lower animals. But something more, would have been wanting. Man is a wandering animal. In the pursuit of those objects, to which he is urged by his necessities or his pleasures, he has to traverse all climates; at one time, braving the storms of the north; at another, fanned by the gentle breezes of the temperate regions; at another, still, melting under the direct rays of an equatorial sun; and all this he has, in a commercial age, frequently to undergo, with the rapidity which art has given, or may yet give, to the means of transportation by land and sea.

It would, doubtless, still be easy for Creative Power and Wisdom to contrive some kind of natural dress, capable of accommodating itself to all these sudden and extensive changes; but, for wise purposes, it has been otherwise ordered. Man has been destined to suit his covering to his own convenience.

Thus his activity is called forth. He finds a new want that must be supplied. He may be placed in the midst of abundance of food; the cocoa-nut and the banana-tree may pour their stores for his subsistence; but even in the climate where these bounties of Nature exist, this is not enough. He may live, but he feels discomfort, unless he discover some mode of sheltering himself from the excessive heats of the day, and the cold dews of the night. He cannot always be under the shade of a rock or a tree. It is desirable that he should have a permanent covering for his body, to shield him from all the changes to which he may be subjected in the open air. Here is a motive to exertion. The want must be supplied by industry; and, however limited the sphere of that industry may be, when man is in the savage state of which we now speak, it is something to have an object in view, which teaches the pleasure of exercise, and rewards activity.

His ingenuity, as well as activity, is called into exercise. Clothing is not to be found ready prepared. Even the bark of the paper-mulberry and the bread-fruit tree must undergo a rude manufacture, before it be fit for use. A simple covering to part of the body, is all that the rudest tribes affect; but yet, among them, this is distinguished by degrees of excellence, and is coveted for its superior qualities. Various principles are called into action by the same want, further developed, in more advanced stages of society; the love of possessing, the desire of distinction, a taste for what is beautiful, an admiration of what is ingenious, a delight in personal indulgence, a generous regard for the interests of society; and all these principles stimulate the inventive faculties, and promise a reward to the skill and industry of the manufacturer. Thus a foundation is laid, in the human mind, for improvement in this as well as other arts.

On the other hand, Nature adapts her supplies to the exercise of these principles ; or, to speak more correctly, the God of Nature follows out, in this department, the wise and far-extended plans of his providence, for the training and discipline of the human mind. We shall afterwards examine the details of this providential system ; but let us at present inquire into its nature.

All our articles of clothing are, as regards the fabric itself, derived from the vegetable or animal kingdom. The same living principle which elaborates our food, prepares also our clothing. This is assuredly an intended arrangement, and it is of some importance in that economy, which regards man as a being whose faculties require to be stimulated. It affords additional employment to his mind, in the pursuits of agriculture. Vegetables have to be cultivated, and animals reared, to supply human wants, in articles of clothing, as well as of food. Here, again, we see the operation of that remarkable law, which dooms man to laborious exertion, and, by that exertion, gives power and enlargement to his faculties.

The variety of the articles of clothing which civilized man requires to supply his wants, or satisfy his taste or ambition, is another element which must not be overlooked. The constitution of Nature favors, or rather cherishes, this desire for variety. There are numerous plants, which furnish the raw material for manufacture ; the sheep gives its wool; the goat and the camel their hair ; the ermine, the beaver, and the bear, their fur ; while various animals afford their hides for a similar purpose. The skins of animals appear, indeed, to have been very early and very extensively used for clothing, in the temperate regions of the earth. It was a natural thought, to transfer the dress, with which Providence had furnished the brute, to the purpose of warming or ornamenting that higher species, whose rational powers had given him dominion and skill, and whose wants demanded a supply.

It is interesting to trace the progress of each of the arts, and of none more than of that which affords a covering to the human frame. We can no where more dis-

tinctly trace the workings of the rational mind, nor observe unfolded that remarkable system by which its faculties are developed and called into action.

SIXTH WEEK—SATURDAY.

CLOTHING.—ITS PRIMITIVE STATE.

THE earliest history of the progress of that art, which depends on the necessity of an artificial covering for the human body, is derived from the oldest and most authentic of all records,—the writings of Moses, the inspired servant of God. From that sacred book it appears, that the first clothing of our race was leaves of trees and skins of beasts. In the third chapter of Genesis, it is said of Adam and Eve, that "they sewed fig-leaves together, and made themselves aprons;" and afterwards in the same chapter, it is said, "Unto Adam also and to his wife, did the Lord God make coats of skins, and clothed them." Thus early were both kingdoms of organic nature made subservient to this department of man's wants; as it is from these that his far more varied and extended desires of the same kind are still supplied.

Wherever man is found in a civilized state, clothing is esteemed essential to his comfort, and even to his necessities. The sense of modesty has rendered this law universal, and seems even to have operated more generally than the vicissitudes of climate. There are few parts of the world, exclusive of the regions verging on the poles, where custom might not have rendered an entire destitution of dress compatible with life. This might, perhaps, be inferred from the familiar custom of baring not only the face and hands, but also the legs and neck, which is done with impunity, in the very depth of winter. But history puts the fact beyond dispute; for Julius Cæsar, when he invaded Britain, found our savage forefathers, the Picts of Scotland, living unclothed amidst the vicissitudes of this northern and severe climate. Like other wild tribes, they

had lost the arts of our earliest common ancestors, and had fallen into a state of rude barbarity. It is curious to remark, in passing, that the nation which, about the commencement of the Christian era, was among the most uncivilized of all the inhabitants of Europe, should now take the lead in improvement; and especially that the art of manufacturing articles of clothing, for which they are now so remarkable, should then have been utterly unknown, even in its rudest state, among some of their tribes.

In tracing the history of this art, we must look to Egypt and Asia, as the quarters in which its progress was at the earliest period remarkable. We do not know to what extent the antediluvian world had advanced in their preparations of dress; but I think we may safely conclude, that they did not confine themselves to the mere use of skins and the leaves of trees. They had assuredly made very considerable advances in several of the other arts of life; and those, who had discovered the method of extracting the metals from the bowels of the earth, and converting them to use, not to speak of their skill in music, in the mechanic arts, and in the domestication of the lower animals, could scarcely be ignorant of the art of manufacturing into clothing, various other substances, besides those I have mentioned.

Be this as it may, the perfection to which this art was carried, in the East, at a very early period, is matter of some surprise. Men had soon begun to feel the inconveniences, arising from the stiffness of the skins taken from the larger animals, and the great destruction of life, necessary for their supply from the smaller sorts, and had found out some of the resources, which the Creator had supplied, by other means. The first kind of stuff, which mankind contrived to manufacture, was probably that which goes by the name of the mattrass. This is a composition of hair, wool, or fur, plaited together, and fastened down by the assistance of some natural threads, such as hairs that were longer than ordinary, or tough grasses, or vegetable fibres, separated from trees or other plants. The mattrass squeezed, flatted, and fastened together for the intended use, either to serve as a covering, or to lie upon,

naturally gives the idea of felt, and this was perhaps the next step in the progress of manufactures. Felt is a composition of the hairs of fur or down, which, being prepared and soaked in some fatty or glutinous matter, lose their elasticity, intermix, and adhere so to one another, that they cannot readily be separated, forming a substance somewhat flexible, and of a pretty uniform thickness. A remnant of this species of manufacture, is still common among us, in the form of hats ; and the cloth made in the islands of the South Sea, appears, from the descriptions of Captain Cook, and other circumnavigators, as well as from the specimens which have been brought to Europe, to be somewhat of a similar nature.

These, however, were but imperfect improvements in the art ; and a much further advance in manufacturing skill was necessary, to give the desired lightness, flexibility, and softness to dress. But the appetite for melioration, once felt, could not be expected to cease here. Nature had furnished too many useful substitutes, to suffer the ingenuity of man to be so soon exhausted. The simple principle of the mattrass, that of plaiting one substance with another, came quickly to be extended. As soon as it was ascertained that threads could be formed by the twisting of wool, of hair, or of fibrous substances, the advance was easy from the mattrass to the cloth. It was but the interlacing of one thread with another, instead of employing the threads as fastenings to a plaited, but untwisted substance. This method of making stuffs, is perhaps the most useful invention, known in human society, and has gradually risen to a perfection, which exhibits, in an astonishingly favorable light, the inventive powers of man.

The most simple method of weaving, and probably the earliest, is that of which we still have an example, in the act of darning. It consists of a number of long threads, stretched side by side, and fastened at the ends, through which a needle, with a loose thread attached, is made transversely to pass alternately above and below, so as to interweave itself with them. This, however, is a tedious operation, and the ingenious device of the loom would not be long wanting, after the inventive faculties of man were

awakened, and a demand for woven stuffs had become general. The loom is an instrument, so framed, that each alternate thread, stretched upon a common roller, may, by means of a simple and ingenious mechanism, be alternately elevated and depressed. This is called the warp, which forms the foundation of the stuff, and hence is called *stamen* by the Romans. The intention is to receive and catch hold of another thread, called the *woof*, which is thrown through them by a shuttle, an instrument with two points, swelled in the middle to receive a pirn, or quill, as it is commonly called. By this invention, the very same operation is performed, as by darning, but with immensely greater quickness and precision. The fabrics thus manufactured, can be made of any fineness or delicacy, which the necessary strength of threads will admit; and great variety, also, can be introduced into the workmanship; so that the principle of the loom, though so simple, may be considered as the perfection of art. That there are substances, capable of being formed into threads of great fineness and tenacity, depends on qualities which the Creator, doubtless for this very purpose, has bestowed on various modifications of vegetable and animal nature. These have already been adverted to in the 'Spring' volume, but must again come under our notice, with a special view to the particular object in question.

SEVENTH WEEK—SUNDAY.

THE EMPTINESS OF HUMAN ATTAINMENTS.

THE wonderful discoveries, which human ingenuity has made, and the astonishing results of human industry, have a tendency to make us lose sight of our defects and weaknesses. Every one who knows any thing of his own heart, must be sensible of this. We are apt to cherish sentiments of self-dependence and self-sufficiency, totally

at variance with our real situation. We forget that we are the weak and perishing creatures of a day; that we have nothing which we can call our own, nothing on which we can rely; that there is a resistless current constantly passing over us, and sweeping away every earthly prop, on which we rest for support. Above all, in the bustle of an inventive and toiling world, we too often cherish the insane and ungrateful propensity, of attributing to ourselves all the powers, and talents, and acquirements bestowed upon us by Providence, and reject those religious sentiments of dependence and filial submission, which are so delightful in themselves, and so suited to our condition. It is of importance, therefore, that we should frequently be brought back to a sober view of human life, as it ought to appear in the sight of a being destined for immortality.

It is not to be denied, that human attainments are desirable; but then, to be so, they must be properly applied. They can only be called useful acquirements, when directed to pursuits, ennobling in their nature, and permanent in their duration. The philosopher may make wonderful discoveries; but they are wonderful only to such ignorant and short-sighted creatures as himself. How ridiculous his pride and parade must appear in the sight of superior beings, who perceive that he has been all the while merely skimming the surface of Nature, and is profoundly ignorant, even of what he pretends to have investigated, and still more of what it most imports an immortal creature to know! If we turn from science, to the arts, we shall find that those who are most deeply versed in worldly wisdom, and most successful in promoting their temporal interests, are often utterly ignorant and regardless of whatever relates to their eternal welfare: but, "what shall it profit a man if he shall gain the whole world, and lose his own soul?" If, again, we regard the pursuits of ambition, whether wealth or greatness be the object, we shall find an equal degree of emptiness and vanity attaching to them. How contemptible are those honors which cannot shield their possessor from one real calamity; which the breath of mortals can

give and take away, and which, at all events, in a few years, must end in the grave! How worthless those riches which leave their owners as helpless, as liable to disappointment, sickness, and death, and as wretched as the meanest of their dependents. Learn what we will, and possess what we may, we are still weak and perishing creatures, and we in vain seek, in any earthly attainment, for what may satisfy the longings of a rational and immortal soul.

But there is another, and far more important, light, in which we ought to view this subject. Not only have we no reason to glory in these things, but we have cause, on account of our abuse of them, to regard them with the deepest humility and self-abasement. They are not of our own creation; they are the gifts of God. Whether they consist in natural endowments of body or mind, or in hereditary possessions, or in attainments of labor or of skill, they are still bestowed by Him who made, preserves, and governs all things; and, what is more, they are conferred, not for the purpose of gratifying our pride or selfishness, but that they may be employed for promoting His glory, and the good of our fellow-creatures. And can we say, that we have been faithful stewards of the Divine bounties; that we have used the world as not abusing it, and have occupied the talents committed to us, for the purposes for which they were granted? Alas! have we not, on the contrary, too frequently employed them in acts of rebellion against our Divine Master and Lawgiver? And does it not, therefore, become us rather to ask, "What profit is there in those things?" than to employ them for fostering a senseless vanity, or for the indulgence of enervating and debasing luxury?

The unsatisfactory nature of earthly things should induce us to set our affections on things above. "Let not the wise man," says the Scripture, "glory in his wisdom; neither let the mighty man glory in his might; let not the rich man glory in his riches: but let him that glorieth, glory in this,—that he understandeth and knoweth me, that I am the Lord, which exercise loving-kindness,

judgement, and righteousness in the earth, for in these things I delight, saith the Lord."* What an unspeakable satisfaction is it to know, that the Creator and Governor of the universe, condescends to be our Father and our Friend; that He hath sent his Son to save us, and that His Holy Spirit communicates with us to purify, enlighten, and guide us. If mortification and disappointment await us, in the contemplation of human life, a very different feeling rises within us, when we reflect on that Paternal care which continually watches over us to promote our eternal welfare. The revelation which the Eternal has made of his character, and especially of the manner in which his perfections are exercised for the salvation of the guilty race of Adam, can never be regarded with an admiration sufficiently profound. To man, himself, in the abuse of that freedom of will with which his Creator had honored him, do we trace the evils which beset his path through the earthly wilderness. The remedy for such evils, was provided, before his guilt had incurred them; and, what is remarkable, these very evils were to be employed as one of the means by which the remedy was to be applied. He was to be disciplined in the school of adversity. By the various vicissitudes of his lot; by pain succeeding pleasure, by health alternating with sickness, and hope with disappointment,—his virtues and graces were to be tried. By a wonderful train of adaptations between the natural and moral world, his mental powers were to be elicited. In grief, in suffering, in want, and in weakness, his faith and patience were to be called forth and strengthened; temptations were to be overcome; passions were to be subdued; a right hand was to be cut off, a right eye plucked out, and through many trials and much tribulation, the renovated child of earth was to enter into the kingdom of heaven.

* Jeremiah ix. 23, 24.

SEVENTH WEEK—MONDAY.

CLOTHING.—ITS ANCIENT HISTORY.

THERE are three ways, by which we are enabled to judge of the state of mankind in the early ages with regard to articles of dress: we may consult historical records; we may examine ancient statues and paintings; and we may discover actual specimens of ancient clothing, especially in the envelopes of mummies, as noticed in a previous volume.

In referring to the first of these methods, I have already adverted to the writings of Moses. In these, we find various incidental or direct notices, by which some light is thrown on the subject. I have elsewhere mentioned the proof we have, from this source, of the progress of the art of weaving linen in Egypt, so far back as the time of Joseph. In these writings, too, we find proofs of taste and magnificence in articles of dress, in the description given of the habits of the high priest, and the vails of the tabernacle. The tissue of all these works was of linen, of wool, of goats' hair, and of byssus.* The richest colors, gold, embroidery, and precious stones, united to embellish them.

That the art of dyeing stuffs, was familiar in those early ages, we have sufficient proof. They were even woven of divers colors. We read of Joseph's "coat of many colors," a gift of paternal affection, and an object of envy to his brethren; and though we were to consider this as a mistranslation, yet we find in the book of Exodus several instances, in which party-colored cloths are distinctly spoken of.† Embroidery is also mentioned,

* [This word seems to have been used by the ancient writers sometimes for linen and sometimes for cotton. When applied to the cloths in which the Egyptian mummies were wrapped, it must mean linen, it is said, as the fibres of these cloths have been subjected to microscopic examination, and proved to be linen.—AM. ED.]

† Exodus xxvi. 31. "Thou shalt make a vail of blue, and purple, and scarlet, and fine twined linen of cunning work," or, "of an agreeable variety," as it might be translated. See also the first verse of that chapter, and the second verse of the thirty-ninth chapter.

which is a still further step in the manufacture of ornamental clothing. The Hebrew term employed to express this kind of manufacture is significant, and seems to intimate that shading was employed, which requires considerable nicety of art, as well as taste. The word may be literally translated, variegated feathering. Ezekiel, speaking of the wings of the great eagle, uses the very same word,* and it is there rendered "divers colors." The relation between the feathers of birds, and the effect of the Hebrew method of embroidering, which includes, probably, that of Egypt, expressed by the term of the original text, has been supposed to intimate an imitation of the manner in which the colors are graduated in the plumage of birds; and hence it has been inferred, that a considerable progress had been made, even at that early period, in this department of manufacture.† This may, perhaps, be too slender a foundation for such an opinion; but it is, at all events, certain, that the art of embroidering had made considerable advances at a very early period, in the Asiatic regions. Before the war of Troy, the women of Sidon are said, by Homer, to have been famous for their address and dexterity in this manufacture; and the same poet, describing the occupations of Helen, at Troy, says, that this princess worked a wonderful piece of tapestry, in which she represented the bloody battles fought between the Greeks and Trojans. Pope thus translates the passage.

> "Meantime, to beauteous Helen, from the skies,
> The various goddess of the rainbow flies,
> Her in the palace, at her loom she found;
> The golden web her own sad story crowned;
> The Trojan wars she weaved, (herself the prize,)
> And the dire triumphs of her fatal eyes."‡

Andromache, too, is represented as amusing her lonely hours, in the absence of Hector, by having recourse to a similar employment.

* Ezekiel, xvii. 3. "A great eagle, with great wings, long winged, full of feathers, which had *rekamah*," translated "divers colors."

†'Origin of Laws, Arts, and Sciences,' vol. ii. book 2.

‡'Iliad,' book iii. l. 165.

"Far in the close recesses of the dome,
Pensive, she plied the melancholy loom;
A growing work employed her secret hours,
Confusedly gay with intermingled flowers."*

The art must have been considerably advanced before such works could have formed the elegant amusement of high-bred females; and, doubtless, Homer only represented the occupations of the age. It is curious to remark, that, during a period comparatively modern, but not unlike, probably, in some of its characteristics, to the age of Homer, ladies of rank amused themselves with similar works, as the tapestried halls, and embroidered furniture, of ancient castles still indicate. This taste seems to have formed an era in the progress of the art.

It is observable, that Helen's web is said to have been ornamented with gold; and this secret was well known, even so early as the days of Moses. The Scripture states, that they used much gold in the habits of the high priest, and in the vails of the tabernacle. It even describes the manner in which the gold was prepared for this purpose. "They did beat the gold into thin plates, and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work."† It was not then like gold wire of the present day, which is only silver gilt, drawn by the drawing iron; but gold itself, hammered thin, and cut into shreds. I may here remark, that although we find frequent mention of gold stuffs in ancient authors, from the era of Homer downward, no mention is made of silver thread as having ever been used in early times.

It would be interesting to inquire into the processes of dyeing, with which the ancients very early adorned their clothing; but no very precise information on the subject has been handed down to us, although some curious notices are found scattered in various authors. We have already seen, that the beautiful and highly-prized color of purple, which was so extensively appropriated as the hue of royal robes, was known as a dye, in the days

* Iliad, book xxii. l. 566. † Exodus, xxxix. 3.

of Moses.* A later period, however, has been fixed for the discovery of this dye by fabulous antiquity. The honor has been given to the Tyrian Hercules. The tradition is, that when this hero was walking one day on the seashore, with a nymph of whom he was enamored, his dog found a shell, which, being pressed with hunger, he broke ; and the liquid which ran from the expiring fish within, stained his mouth with so beautiful a color, that the fair damsel, charmed with it, declared to her lover that she would see him no more, till he brought her a dress dyed the same color. This caused Hercules to apply his ingenuity to the subject ; and he succeeded in satisfying the capricious vanity of his mistress. There are various other accounts of this invention, one of which places it at the time when the first Minos reigned in Crete, about 1440 years before the Christian era. It was the most expensive of all colors, and even vied with gold in costliness, being extracted from the veins of a small shellfish, which yielded the substance but scantily.† There were other colors, and particularly blue and scarlet, (coccum,) which were much esteemed at this early period ; but we have no distinct account of the manner in which they were procured, although there is good reason to believe that the latter was no other than our own scarlet dye.‡

At a somewhat later period, the Babylonians appear to have distinguished themselves by the richness and variety of their dresses. They excelled in the art of embroidery. They interlaced their robes with gold and

* It is not quite certain that the word translated purple in Scripture, was actually that color. It is, however, used as the word *purpura* with Latin writers, to designate the robes of kings.

† [Many of the species of the *Murex* and *Purpura* yield a purple or scarlet dye. The *Purpura lapillus*, a small and very common shellfish of our New England coast, will be found, on being crushed, to stain the fingers or a piece of white cloth with this hue, after a short exposure to the air, for at first the dyeing substance is white and milky.—Am. Ed.]

‡ This dye is said by Theophrastus to be produced by a sort of grains which they gathered from the bark and leaves of the holm oak. Pliny was aware that these grains contained the germs of an insect. He speaks of "Coccum ilicis celerrime in vermiculum se mutans." [The scarlet grain of the oak quickly changing itself into a worm.]

silver, and studded them with precious stones. These were the ornaments of the highest orders. But even the inferior classes were gayly clothed. They wore a tunic of lawn next their skin, which descended to their feet. Above this, they placed a woollen robe, and last of all a cloak, celebrated for its extraordinary whiteness. They covered their head with a kind of turban, and defended their feet with sandals, while on their legs they wore a kind of drawers or hose, similar, probably, to those which are common in the East at the present day. To complete this equipment, each Babylonian wore a signet ring on his finger, and a curiously-ornamented staff in his hand, with some peculiar device at the top.*

The Medes were another ancient nation, remarkable, at one period of their history, for the magnificence of their clothing. Xenophon tells us, that they wore long flowing robes, with large hanging sleeves, woven with different colors, of the most brilliant hues, and richly embroidered with gold and silver; while they were loaded with bracelets, gold chains, and necklaces, adorned with precious stones.

Nearly the same thing may be said of the Athenians; except that they do not appear to have worn any covering to their head, but were particularly careful to curl and ornament their hair. This taste for elegance of dress, extended even to their slaves. Xenophon assures us, that a citizen of Athens could scarcely be distinguished from a slave, by the richness of his clothing, or by any other external mark.

The particulars already mentioned, are applicable to the clothing of the men. It is in the history of the Greeks, that we, for the first time, have a particular account of the dress of females.† The same studied atten-

*We have these particulars from Herodotus and Strabo.

† [The accuracy of this statement must be doubted. We certainly have notices of the dress of the Hebrew women in the Scriptures, and the indignant mention of the luxurious wardrobe of the "daughters of Zion," by the prophet Isaiah, seems to be sufficiently particular. "In that day the Lord will take away the bravery of their tinkling ornaments about their feet, and their cauls, and their round tires like the moon, the chains, and the bracelets, and the mufflers, the bonnets, and the or-

tion to taste and ornament, which prevails in the present day, seems to have distinguished women of rank at that early period. Their clothes were composed of the lightest and finest stuffs, and were disposed with great neatness and elegance. They spent much of their time in preparing head-dresses, and used the most precious essences in perfuming their hair. They painted their cheeks, blackened their eyebrows, and were careful to use such drugs as might best cleanse and beautify their skin.*

Such are some particulars, gathered from ancient authors, of the progress which took place in the art of clothing down to the era of Roman history, when, by the conquests of that wonderful people, all the luxuries of Greece and of the East were concentrated in the imperial city. It will not be necessary to particularize the state of dress at this later period, as this would lead us into tedious details, and we should have occasion to do little more than to repeat what has already been said. It may be enough to mention, what indeed is abundantly known, that the Romans, not content with importing the magnificence of every country which their arms subjected to them, went beyond all other nations in extravagance and voluptuousness, till effeminacy prepared the way for their fall, as it had done for that of the empires which preceded them.

SEVENTH WEEK—TUESDAY.

CLOTHING.—COMMERCIAL HISTORY OF ITS RAW MATERIALS.

THERE are four distinct classes of the raw material which forms human clothing, two of which, cotton and

naments of the legs, and the headbands, and the tablets, and the earrings, the rings, and nose jewels, the changeable suits of apparel, and the mantles, and the wimples, and the crisping pins, the glasses, and the fine linen, and the hoods, and the veils." Is. iii. 18—23. Is it reasonable to suppose, indeed, that there ever was a period when females were not fond of dress, and did not pay especial attention to it?—AM. ED.]

* Lucian. Amor. n. 39 and 40.

flax, belong to the vegetable kingdom, and the other two, silk and wool, are the produce of animals.

I have, in the 'Spring' and 'Summer' volumes, given some description of all these productions, and the present paper shall be occupied with a slight sketch of their commercial history. Flax and wool were, doubtless, the first two of these materials used in Europe for manufactured clothing; but which of them had the precedency, it may be difficult to determine. From the earliest period of European history, they were both very generally employed, though the linen made of the former was at first more usually applied to the sails of ships, than to the purposes of dress.

It has already been mentioned, that the art of preparing flax, and weaving it into fine linen, was very early known in Egypt. Solomon imported from this country flaxen yarn, which was woven by his subjects into cloth; and it is supposed that the Grecians, who were early familiar with the use of this material, derived also their knowledge of it from the Egyptians.* They were still noted for their manufacture of linen, and their export of flax under the Roman emperors. The great proficiency of that ancient people in the manufacture is not only proved by the linen found enwrapping their mummies, which has elsewhere been noticed, but also by the existence of a curiously-wrought linen corslet, in the time of Herodotus, in the temple of Minerva, in Rhodes, part of which was preserved so late as the age of Pliny. It belonged to Amasis, king of Egypt, who lived about six hundred years before Christ. Each thread of this remarkable relic was composed of three hundred and sixty filaments, and it was ornamented with cotton and gold.

Woollen manufacture is mentioned in Scripture, along with that of linen; and in Greece, they both existed in the time of Homer. Cloth of the former material was, indeed, more usually employed in Europe, as I have already stated, than of the latter, on account of the coolness of the climate; while, in the warmer countries of Egypt and Southern Asia, the case was reversed.

* Herodotus mentions that linen was originally imported from Egypt into Greece.

Down to this period, and for a considerable time afterwards, neither cotton nor silk was known in Europe, or even in any of those nations which were open to Europeans. Herodotus, who wrote about four centuries and a half before the Christian era, is the first Greek historian who mentions the cotton plant, unless indeed it be the same as byssus; and he speaks of it as entirely confined to India. It is interesting to observe the terms in which this useful substance, afterwards to be so much prized, and so universally used, is first noticed by a historian of Europe. "They (the inhabitants of India) possess likewise," says he, "a kind of plant, which, instead of fruit, produces *wool* of a finer and better quality than that of sheep; of this the Indians make their clothes."* The next mention of the cotton plant, occurs more than a hundred years afterwards, connected with the history of Alexander the Great. Nearchus, the intelligent and observant admiral of this conqueror, at his command descended the Indus, and navigated the coast of Persia; and, in his narrative, preserved in Arrian, he says, that "the Indians wore linen garments of a substance growing on trees; and this," adds he, "is indeed flax, or rather something much whiter and finer than flax."†

It appears that, in the time of Pliny, who lived about the end of the first century, the cotton plant had found its way into Egypt, and was cultivated for manufacture near the Arabian boundary of that kingdom. "There is nothing," he says, "to be preferred to these stuffs for whiteness or softness. Beautiful garments are made from them for the priests of Egypt."‡ Arrian, who wrote soon after, was the first to mention cotton as an article of commerce; and he gives some curious details, which show that the manufacture of calicoes and muslins, was then nearly in the same state, in India, as it is in the present day.§ It is a remarkable and almost unaccountable fact, that, although cotton goods had, at this period, become an article of commerce, and even of manufacture,

* Herodotus, book iii. c. 106. † Arrian's Indian History, chap. xvi.
‡ Plin. Hist. Nat. lib. xix. c. 1. § Periplus.

in Egypt, they were scarcely known, or at least little used, on the European side of the Mediterranean, for nearly thirteen centuries later.

Of silk, although from time immemorial an article of exclusive manufacture among the Chinese, the most confused notions were long entertained in Europe. It was, however, very early imported and re-spun and woven in the Island of Cos, situated in the Archipelago. This is mentioned by Aristotle, who gives the first distinct account of the nature of the produce, having received accurate information by means of the conquests of his enterprising pupil, Alexander. Silk, however, was little known in Europe before the reign of Augustus ; and, during a long succeeding period, it remained very costly, though much esteemed. Only a small quantity reached the imperial city, by a circuitous route. During the reign of Tiberius, the use of the Oriental manufacture was confined to women of rank. Men were restrained, by a law of the senate, from clothing themselves with such effeminate apparel, although the slighter and inferior fabrics of Cos were used, in the heat of summer, by the more luxurious of both sexes. The high price of silk, in the end of the third century, may be judged of from the recorded fact, that the Emperor Aurelian refused the entreaties of his Empress to clothe himself in this article, alleging that such a luxury could only be obtained "in exchange for its weight in gold."

It was not till the time of Justinian that, by the transportation of the eggs of the silkworm to Constantinople and the Island of Cos, the enormous price of this beautiful fabric was materially reduced. This was effected by means of two Persian monks, who, having been employed as missionaries in India, had penetrated into China. "There, amidst their pious occupations," says Robertson, "they viewed, with a curious eye, the common dress of the Chinese, the manufactures of silk, and the myriads of silkworms, whose education, either on trees or in houses, had once been considered the labor of queens. They soon discovered that it was impracticable to transplant the short-lived insect ; but that, in the eggs, a numerous

progeny might be preserved and multiplied in a distant climate." Having secretly obtained a quantity of eggs, they succeeded in concealing them, and in conveying them safely to Justinian. This happened in the year 552. The eggs were hatched, in the proper season, by the warmth of manure, and thus a foundation was laid for a European manufacture which has added so materially to the beauty and elegance of the dress of the inhabitants. For six hundred years after this period, the productions of the silkworm, in Europe, were confined to the Roman empire ; and, in the middle of the twelfth century, this once-powerful people, although degenerated in their spirit, and circumscribed in their boundaries, continued to excel other nations of this quarter of the globe, in the quality and variety of their manufactures, and in the ingenuity of their artisans. By them alone, up to this period, were the silkworms raised, and the produce of these insects converted into webs for human clothing.

Such is a short outline of the progressive steps by which European nations came into possession of the great staple materials of our present manufactures ; and so slow, and full of difficulties, were the first beginnings of those arts, from which were to flow, in after-times, the conveniences and elegances, if not, strictly speaking, the necessaries of human life. The modern history of these manufactures requires a more extended consideration.

SEVENTH WEEK—WEDNESDAY.

CLOTHING.—THE SILK MANUFACTURE—ITS MODERN HISTORY.

It is striking to remark, in what manner Providence frequently overrules the ambition and cruelty of man, to promote some great purpose connected with the improvement of the human race. We have frequent instances of this in the diffusion of the arts by means of conquest, an example of which appears in the history of the silk

manufacture. The exclusive possession of this manufacture remained till the middle of the twelfth century, as I noticed at the conclusion of yesterday's paper, in the hands of the dependencies of the eastern Roman empire. At this period, Roger I., King of Sicily, made many successful incursions into the territories of that once formidable nation; and, not content with carrying off the wealth of Athens, Thebes, and Corinth, also led into captivity a considerable number of silk-weavers, whom he compulsorily settled in Palermo, obliging them to impart to his subjects a knowledge of the art.

In twenty years after this forcible establishment of the manufacture, the silks of Sicily are described as having attained decided excellence; as being of diversified patterns and colors; some fancifully interwoven with gold, some richly adorned with figures, and others tastefully studded with pearls.* By degrees, the knowledge of the several processes required in the art, spread over the greater part of Italy, and was carried into Spain; but it was not till the reign of Francis I., that the silk manufacture took root in France.

Before the conquest, there is no proof that silk was known, or, at least, worn in England. It is certain, however, that the use of this article was extensively adopted soon after this era of British history; for, in the year 1251, at the celebration of the marriage between Margaret, daughter of Henry III., and Alexander III., of Scotland, amidst a most extravagant display of magnificence, a thousand English knights appeared, on the nuptial day, in *cointisies* of silk, which were used merely to grace the solemnity, and were next day thrown aside.

In connexion with the history of this manufacture in England, it seems proper to mention, that in the year 1554, during the reign of Mary, a sumptuary law was made, the declared object of which was to encourage home manufactures, and to restrain the growing vanity of the lower classes of the people. This statute enacts, that, "Whoever shall wear silk in, or upon, his or her hat, bon-

* Otho Frising. Digest Frederici.

net, or girdle, scabbard, hose, shoes, or spur leather, shall be imprisoned three months, and forfeit ten pounds;" excepting from this restraint magistrates of corporations, and all other persons of still higher condition. This absurd law, which showed at once the growing luxuries and prosperity of the middle classes, and the narrow maxims of the government, survived the reign of Elizabeth, and was not repealed till the first year of the First James.

Although, about this period, the citizens of Antwerp traded pretty extensively in silk, which they received from the seaports of Italy and Sicily, in exchange for other merchandise, yet this material was then so little known as an article of commerce in Britain, as almost to render the prohibition a dead letter. Silk stockings, at least, were exceedingly rare. I have elsewhere mentioned, that James I. found it necessary, before his accession to the English crown, to borrow a pair of silk stockings, that he might appear to advantage in the eyes of the English ambassador; and there are facts of a similar nature, which show that the destitution was scarcely less remarkable in the southern division of the island. Henry VIII., that magnificent and expensive prince, was obliged, we are told, to restrict himself to the use of silk stockings on gala days, which were procured from Spain. Edward VI. received a present of a pair of silk stockings from Sir Thomas Gresham, which was much noticed as a magnificent gift; and his sister and successor, Queen Elizabeth, was presented with "a pair of knit black silk stockings," by her silk woman, with which she was so much delighted, that she never afterwards condescended to wear those of cloth.

We have another instance in the history of this manufacture, of the effects of a cruel and exterminating war, as being eventually overruled for the advancement of the arts. The city of Antwerp having, in the year 1585, been taken and sacked by the Duke of Parma, about a third part of the artisans and merchants of Flanders and Brabant, who wrought and dealt in silk, took refuge in England, where they finally settled, and taught those arts by which they had long prospered in their native land.

The silk manufacture became, by this means, of national

importance in this island, and was the object of royal proclamations and legislative enactments for its encouragement. Foreign silk goods, however, continued long to be preferred; and, so late as the year 1668, French fabrics were so much in fashion, that it was a matter of complaint, that "women's hats were turned into hoods made of French silk, whereby every maid-servant became a standing revenue to the French king of one-half of her wages."

Notwithstanding this predilection for foreign goods, the English manufacture has gone on steadily advancing in quality and amount; so as to afford, as a recent author observes, one of the most striking instances on record, in which an art, borrowed from other nations, and employed on a material of entirely foreign growth, has been made at least to equal, if it does not surpass, the productions of those countries from which it was derived.

It seems as if the history of this manufacture was intended to afford constant illustrations of that remarkable feature in the character of the Divine government, by which the bad passions of men are caused to promote the accomplishment of some important purpose in the advancement of society. A century after the destruction of Antwerp had transferred the silk trade, along with many industrious artisans, to England, the treacherous revocation of the edict of Nantes, by Louis XIV., compelled at least half a million of merchants, manufacturers, and tradesmen, to fly from France. About seventy thousand of these made their way to England and Ireland, with such property as the emergency of the case allowed them to carry away. A large number of them, who had been engaged in the fabrication of silks, resorted to Spitalfields, contributing much, by their knowledge and skill, to the improvement of the manufacture in England. Descendants of many of the refugees are still found in the same spot, engaged in the same occupation. The cruel decree in question was attended with effects which those who perpetrated that act of oppression, did not foresee. A large population, possessing knowledge and dexterity in the arts of life, were thus scattered over Europe, and, intermingling with the less instructed of other nations, accelerated the general civilization.

At the close of the sixteenth century, the English, who had previously been content to adopt the inventions and the plans of others, entered upon that course of mechanical improvement, which has since been prosecuted to such important results. An engine for knitting or weaving stockings, was at that time invented by the Rev. William Lea, of St. John's College, Cambridge, which was important, not only as it enabled our ancestors to discard their former inelegant hose, but still more as it caused the English manufactures to excel all of foreign production. The invention of the stocking-frame led to the exportation of vast quantities of silk hose to Italy. These maintained their superiority for so long a period, that Keyslar, in his travels through Europe, as late as the year 1730, remarks that, "at Naples, when a tradesman would highly recommend his silk stockings, he protests they are right English."

The success which attended Mr. Lea's invention was not, however, immediately consequent upon its introduction. On the contrary, the small use made of woven stockings in England at that time, caused the machine to be long neglected; and so little was the encouragement which he met with at home, that Mr. Lea was induced to comply with the invitation of Henry IV., of France, and, accompanied by several journeymen, established his looms for a time at Rouen in Normandy. The subsequent assassination of his royal patron, and the internal troubles of France which followed that event, compelled him, however, to abandon the establishment; and, falling into a state of destitution, he soon after died in Paris.*

SEVENTH WEEK—THURSDAY.

CLOTHING.—THE SILK MANUFACTURE—HISTORY OF MECHANICAL CONTRIVANCES CONNECTED WITH IT.

I HAVE already noticed the first invention of the weaving machine for stockings, by an English ecclesiastic;

* Lardner's Cyclopedia—Silk Manufacture.

but it may be interesting briefly to trace the progress of machinery as connected with this art, from the earliest times which history makes known to us.

The native place of the silk manufacture was, doubtless, the same as that of the raw material; but we have no authentic account of the origin of this manufacture, and are only aware of its existence in China, in the earliest times to which our acquaintance with that country reaches. The celebrated traveller, Marco Polo, at the close of the thirteenth century, gave to the world a narrative of his wanderings, wherein is contained an interesting account of China. At that time, the silk manufacture was carried on to a vast extent in that empire. He describes the whole country to be filled with great, rich, and crowded towns, thronged with manufacturers of silk, and of other valuable merchandise; and, speaking of Cambalu, the royal city, he informs us, that "no fewer than a thousand carriages and pack-horses, loaded with raw silk, make their daily entry into the city; and silks of various textures are manufactured to an immense extent."

The mode in which this manufacture is performed in China, is stated to be, even at the present day, extremely rude, notwithstanding the excellence of the fabrics produced. In that extraordinary country, as well as in India, the human mind is subjected to trammels, which have kept it stationary for many ages, and afford us good ground for believing, that the present machinery and mode of manufacture is nearly the same as that which prevailed many centuries ago.

The following is a description, given in Lardner's Cyclopedia, of the mode in which the operation of weaving is conducted in India, which may serve to afford a pretty correct idea of the manner in which the art is practised in the kindred country of China. "The wretched weaver performs his labors in the open air, choosing his station under trees, whose shade may protect him from the scorching rays of the sun. Here, extending the threads which compose the warp of his intended cloth, lengthwise between two bamboo rollers, which are fast-

ened to the turf by wooden pins, he digs a hole in the earth large enough to contain his legs, when in a sitting posture ; then, suspending to a branch of a tree the cords which are intended to cause the reciprocal raising and depressing of the alternate threads of his warp, he fixes underneath, and connected with the cords, two loops, into which inserting the great toe of either foot, he is ready to commence his operations. The shuttle, wherewith he causes the cross threads, or woof, to interlace the warp, is in form like a netting-needle, and, being somewhat longer than the breadth of the warp, is made to perform the office of a batten, by striking the threads of the woof close up to each other.

"With this rude apparatus," the author adds, "the patient Indian succeeds in weaving fabrics, which, for delicacy of texture, cannot be surpassed, and can hardly be rivalled, by the European weaver, even when his labors are aided by the most elaborate machinery. But it is only in climates where the absolute natural wants of man are few, and under systems of government where the oppressions of the dominant caste deprive the unhappy bulk of the people of all means of attaining more than suffices for the barest supply of those wants, that such labors can be performed."*

The machine employed in Europe, for enabling the weaver to perform his labors, differs from that of the tradesman of China and of India, not in principle, but in some very obvious mechanical improvements, which are too well known to require description. Up to very recent times, it has undergone few changes. It is remarkable, that, in England, where the practical application of mechanical science to the arts, has been long an object of study, they are indebted for many of the late improvements to foreign, rather than native, ingenuity. Looms exactly similar, both in form and arrangements, to those which have been used, time out of mind, by the weaving craft, are still to be seen in daily occupation, and are even preferred for every purpose to which they can be made available, by the laboring artisan.

* Lardner's Cyclopedia—Silk Manufacture.

For figure-weaving, a more complicated apparatus is required; it is the art of producing various patterns in the cloth, either by the introduction of threads of various colors, or by a different arrangement of the threads, or by using, in the same fabric, threads of different substances. This interesting art is of very ancient invention; but till lately, the machinery by which it was effected, was comparatively imperfect. Into the nature of that machinery, and the contrivances by which it has been improved, it would be foreign to my purpose minutely to inquire. I shall merely state, that a recent invention seems to have formed what may almost be considered a new era in this interesting art. It is called a Jacquard, from the name of its ingenious inventor, who was a practical weaver of Lyons, and fell an early victim to the intensity of his mental application.

In the course of the very few years which have elapsed since its introduction into this country, the Jacquard-loom has entirely taken the place of every other method of figured silk-weaving, and has been, in no small degree, instrumental in bringing that curious and beautiful art to its present state of advancement. The elaborate specimens of brocade, which used to be brought forward as evidence of skilfulness on the part of the Spitalfield weavers of former days, were produced only by the most practised among the craft, who bestowed upon their performances a very painful amount of labor. The most beautiful products of the loom, in the present day, are, however, accomplished by men possessing only the ordinary rate of skill; while the labor attending on the actual weaving, is but little more than that demanded for making the plainest goods.

As a further improvement in the art of silk-weaving, I might mention the application of the power-loom to this species of manufacture; but, although the experiment has been tried, it is considered doubtful if the use of this principle, as applicable to silk-weaving, can be productive of any material advantage, except in the most common branches of the work; and I shall, therefore, reserve any observations on this branch, till I come to speak of the cotton manufacture.

I shall conclude this part of our subject with the following judicious observations of the author, on whom I have already freely drawn.

"It would be a curious subject of inquiry, to follow out to their ultimate consequences, and through all their ramifications, the effects resulting to society from the introduction of new luxuries; to ascertain the degree wherein the indulgence, by the wealthy, of wants called into existence, by the very means afforded for their gratification, brings other enjoyments within the reach of a larger number, by reason of the new demand for industrious labor thus created; and to learn how a still larger class are, through the spirit of emulation, rendered so desirous of acquiring an equal participation in comforts enjoyed by their former equals, as to give an effectual spur to their industry and ingenuity. Luxuries, when they have been long enjoyed, become, in a manner, necessary to our happiness; to be without them, when others are not so deprived, is to feel ourselves lowered in the scale of society,—a degradation, to which but few individuals would willingly submit, while the means of avoiding it continue within their reach. * * * The natural wishes of every man are placed upon the acquirement of something more and better than that which he at present enjoys; and society is thus led, by the concurring efforts of each of its individual members, progressively and steadily onward."

SEVENTH WEEK—FRIDAY.

CLOTHING.—THE SILK MANUFACTURE—REARING OF THE COCOONS, &c.

ALTHOUGH it would not be consistent with my plan, to enter into minute details of the progress of the silk manufacture, or of the mechanical improvements by which it has been brought to its present state of prosperity, there are some further particulars which are too interesting not

to be deserving of notice; and these I shall, without much attention to arrangement, collect together in the present paper.

In the 'Spring' volume, I have given some account of the little insect, from whose cocoons the silk is extracted, to which I must refer the reader. Its sole food, in its caterpillar state, is the mulberry-tree, exemplifying an extensive provision of the Creator, by which a particular species of vegetable food seems purposely formed for the subsistence of particular kinds of animals, and thus affording a new evidence of the studied adaptations which constantly occur between the vegetable and animal worlds. This will appear the more remarkable in the case of the silkworm, if it be true, as is alleged, that no other insect will feed on the mulberry-leaf. Experiments have been made, to test this fact, with various kinds of insects; but they all rejected this species of food, except in a single instance, when a green worm, apparently compelled by hunger, subsisted on it. During a continued observation of three years, Miss Rhodes never once found an insect upon the leaves used by her. Other fruit-trees and vegetables in the same garden, were sometimes covered with myriads of insects, while the mulberry-tree, surrounded by these ravagers, remained sacred from their depredations. Not even the aphides invade this tree, exclusively devoted to the use of the silkworm.

There are two qualities in a mulberry-leaf, chiefly necessary for the production of silk;—saccharine matter, which sustains the insect, causes its increase in size, and goes to the formation of its animal substance; and resinous matter, which, according to Count Dandalo, produces the material of the cocoon, or, as he expresses it, "separating itself gradually from the leaf, and attracted by the animal organization, accumulates, clears itself, and insensibly fills the two reservoirs, or silk vessels." It follows, that the quantity of the produce may be materially affected by the soil and climate, as these must, to a certain extent, affect the secretions; and this may account, in a certain degree, for the fact, that some situations, where both the mulberry-tree and the silkworm are

found to thrive, are not so favorable as other places for the production of the material.

The weight and length of reeled silk that can be obtained from each cocoon, are very variously stated by different authors; and, indeed, vary considerably, according to circumstances. Some statements on the subject are very extravagant. Among others, Isnard, an old author, affirms, that the silk of one cocoon, when drawn out, will measure six miles in length, that is, 10,560 yards! Count Dandalo, at once, contracts this measurement more within the limits of probability. He found, that a silkworm's labors seldom exceed the production of 625 yards; and this itself is an astonishing quantity, when we reflect upon the brief period employed by so small a creature in its production. Miss Rhodes and Pullien give a considerably smaller produce, as the result of their experience. It has been calculated, that one pound avoirdupois, such is the extreme fineness of the thread, would extend 535 miles, and forty-seven pounds would encircle the globe.

It is found, that, to obtain one pound of reeled silk, twelve pounds of cocoons are required; that rather more than 2800 worms are employed in forming these cocoons, and that to feed these during their caterpillar state, 152 pounds of mulberry-leaves must be gathered. This pound of reeled silk is capable of being converted into sixteen yards of gros-de-Naples, of ordinary quality, or into fourteen yards of the best description.

Before closing the history of the silk manufacture, I may mention, in a few words, the attempts which have been made to rear the worm in Great Britain, and its colonies. James I., encouraged by the partial success of Henry IV., of France, zealously endeavored to stimulate his subjects to the introduction of silk production in his own country. Being, however, disappointed in his attempt at home, he extended his views to the American colonies, and urged the Virginian Company to promote the cultivation of mulberry-trees, and the breeding of silkworms. His countenance incited the company to make the experiment; but, after much apparent promise of success, the project was abandoned, chiefly owing to the misfortunes

which the colony of Virginia at this time experienced, and which involved the dissolution of the company. Subsequent attempts to introduce the culture of the silkworm into that part of the world, were, from various causes, not probably connected with the climate, rendered abortive. The same may be said of the various projects which have been set on foot, both in England and Ireland, for accomplishing a similar object. They have all failed, notwithstanding both the worm and its food can be raised there in great abundance; and the experience of Sweden, and other northern countries, has shown that a silk of superior quality may be raised in climates equally removed from the intense influence of the sun. The reason of the failure seems to lie in the high comparative price of labor in England. In manufactures, this discouragement is obviated by the superior excellence of the machinery, and extent of the capital; while, to the rearing of the silkworm, these advantages will not apply.

[If the high price of labor is the cause of the poor success of the silk manufacture in England, it will operate still more against the same manufacture in the United States, where the price of labor is much higher. It is certain, that very little progress has as yet been made in this direction. A few acres have been planted with mulberry trees; there are a few establishments which turn out a limited quantity of sewing silk; and a few of the smaller articles of dress have been woven. But this is all. Silk may, in a course of years, rank among the important products of American industry; but there is no probability that this will soon be the case. Let industry of all kinds be encouraged; but let flushed and extravagant speculation, of any kind, be checked. Am. Ed.]

How beautiful is the provision by which existence and enjoyment have been profusely extended, to produce an elegant article of clothing! And this is a creative arrangement analogous to many others. To procure us food, flocks and herds are reared in abundance and fostered with care. To assist our labor, or our easy conveyance from place to place, other species of animals are propagated, and kindly protected; and again, in the pres-

ent instance, how many myriads of animated beings are cherished into existence, and cared for by man, to supply an admired article of dress! It is said that the quantity of silk used in England alone, amounts to more than four millions of pounds weight; and, to satisfy this demand, no fewer than fourteen thousand millions of animated beings must annually live and die.* If this appear worthy of admiration, let us extend our view from this little spot, over the world; and especially let us look to China, whose dense population amounts to nearly a fourth part of the human race, and remember that this immense portion of mankind, from the emperor on his throne, to the peasant in his lowly hut, are indebted for their clothing to the labors of uncountable millions of these insects; and we shall then perceive to what an amazing extent the same beneficent principle operates in a quarter where, perhaps, it might have least been expected. To discover such wonderful plans for the propagation of life, and the diffusion of enjoyment, does elevate our conceptions of Divine goodness, and afford a peculiar pleasure to the contemplative mind.

SEVENTH WEEK—SATURDAY.

CLOTHING.—THE COTTON MANUFACTURE—ITS FOREIGN HISTORY.†

In Arabia, and the neighboring countries, cottons and muslins came gradually into use; and the manufacture was spread, by the commercial activity and enterprise of the early followers of Mohammed, throughout the ex-

* [The value of manufactured silk imported into the United States in the year 1837, was between thirteen and fourteen millions of dollars. —Am. Ed.]

† In the history of the cotton manufacture, I have made free use of the recent publication of Mr. Baines, a work of much intelligence and research. And to this, and Dr. Ure's scientific work on the Philosophy of Manufactures, I am chiefly indebted for my materials in this department.

tended territories subdued by their arms. It is recorded of the fanatical Omar, the immediate successor of the Arabian impostor, that "he preached in a tattered cotton gown, torn in twelve places;" and of Ali, his contemporary, who assumed the caliphate after him, that, "on the day of his inauguration, he went to the mosque, dressed in a thin cotton gown, tied round him with a girdle, a coarse turban on his head, his slippers in one hand, and his bow in the other, instead of a walking-staff."*

In those lively pictures of Eastern manners, 'the Arabian Nights' Entertainments,' muslins are occasionally mentioned; but it appears that the fabrics which first received the name of muslins, from being made at Mosul, in Mesopotamia, were not cotton, or at least not exclusively so, as Marco Polo says, "All those cloths of gold and silk, which we call muslins, (*mossoulini*,) are of the manufacture of Mosul." It must not be supposed that cotton fabrics have, at any time, wholly superseded the use of linen in Mohammedan countries, or that they were esteemed as comparable in beauty with silks. Linen is still extensively used in Egypt and Arabia, as is shown by many passages in the works of Pococke, Niebuhr, and Burckhardt; but it is also evident, from the travels of Thevenot, Burckhardt, Hamilton, and many others, that cotton is the principal article of clothing, even in those two countries, and still more in Syria, Mesopotamia, Persia, and Asia Minor.

Marco Polo† traces the progress of the cotton manufacture, with minute industry, through the various countries of the East, and dwells especially on the excellence of the art in India, from a very early period, notwithstanding the comparative inferiority of the raw material. As a proof of the skill of the Indian weaver, in the use of the very imperfect loom already described, an account is given of webs of extreme fineness manufactured in that country. From Tavernier, a mercantile traveller, he quotes the following passages:—"Some calicuts are made

* Crichton's 'History of Arabia.'

† A Venetian traveller, who visited nearly all the countries of Asia, at the close of the 13th century.

so fine you can hardly feel them in your hand; and the thread, when spun, is scarcely discernible." "There is made at Secouge, (in the province of Malwa,) a sort of calicut, so fine, that when a man puts it on, his skin shall appear as plainly through it as if he were quite naked." The same writer, speaking of the turbans of the Mohammedan Indians, says, "The rich have them of so fine cloth, that twenty-five or thirty ells of it put into a turban, will not weigh four ounces." Another author, Mr. Ward of Serampore, a missionary, mentions, that, in two places in Bengal, muslin is made so exceedingly fine that, when the web is laid upon the grass, and the dew has fallen upon it, *it is no longer discernible.* Such works of art have been poetically called "webs of woven wind." In the India-house is preserved a specimen of Dacca muslin, of exquisite delicacy, softness, and transparency, brought by Sir Charles Wilkins from India, in 1786, to which is affixed a note, in the handwriting of Sir Joseph Banks, of the following tenor :—

"The portion of skein which Mr. Wilkins gave to me, weighed 34 three-tenths grains ; its length was 5 yards 7 inches ; and it consisted of 196 threads. Consequently its whole length was 1018 yards and 7 inches. This, with a small allowance for fractions, gives 29 yards to a grain ; 203,000 to a pound avoirdupois, of 7000 grains ; that is, 115 miles, 2 furlongs, and 60 yards."

With British machinery, cotton yarn has been spun about a third finer than this, so that a pound weight of the thread would extend to 167 miles ; but none which would stretch further than 119 one-third miles, was ever formed into a web. It cannot but seem astonishing that, in a department of industry where the raw material has been grossly neglected, where the machinery is so rude, and where there is so little division of labor, the result should be fabrics of such exquisite fineness and beauty as to be almost unrivalled by any other nations, with all the assistance of the mechanic arts. Mr. Mill thus accounts for this remarkable fact :—"Weaving is a sedentary occupation, and thus in harmony with the Indian's predominant inclination. It requires patience, of which he has an

inexhaustible fund. It requires little bodily exertion, of which he is always exceedingly sparing; and the finer the production, the more slender the force which he is called upon to apply. But this is not all. The weak and delicate frame of the Hindoo, is accompanied with an acuteness of external sense, particularly of touch, which is altogether unrivalled, and the flexibility of his fingers is equally remarkable. The hand of the Hindoo, therefore, constitutes an organ adapted to the finest operations of the loom, in a degree which is almost, or altogether, peculiar to himself."* To this may be added, what is perhaps not the least important element in the case, though not mentioned by Mr. Mill, the hereditary continuance of a particular species of manufacture, in families, through many generations, which leads to the careful training of children, from their very infancy, to the processes of the art.

It is worthy of remark, that the cotton manufacture was found existing, in considerable perfection, in America, on the discovery of that continent by the Spaniards. It formed, indeed, the principal article of their clothing; as they had neither wool, hemp, nor silk, and did not make use, for this purpose, of the flax which they possessed. We are informed by the Abbé Clavigero, that "of cotton the Mexicans made large webs, and as delicate and fine as those of Holland, which were, with much reason, highly esteemed in Europe. They wove their cloths of different figures and colors, representing different animals and flowers. Of feathers, interwoven with cotton, they made mantles and bed-curtains, carpets, gowns, and other things, not less soft than beautiful. With cotton also they interwove the finest hair of the belly of rabbits and hares, after having made and spun it into thread. Of this they made most beautiful cloths, and, in particular, winter waistcoats for the lords."†

Among the presents sent by Cortes, the conqueror of Mexico, to Charles V., were "cotton mantles, some all

* Mill's History of British India, book ii. chap. 8.

† History of Mexico, book vii. sect. 57, 66.

white, others mixed with white and black, or red, green, yellow, and blue; waistcoats, handkerchiefs, counterpanes, tapestries, and carpets of cotton;" and the colors of the cotton were extremely fine, as the Mexicans had both indigo and cochineal among their native dyes. They also used cotton in making a species of paper; one of their kinds of money consisted in small cloths of cotton, and their warriors wore cuirasses of cotton, covering the body from the neck to the waist.

"It is scarcely to be doubted," says Mr. Baines, after detailing this information, "that the cotton and indigo plants are indigenous in America, as well as in India; but the arts of spinning and weaving were probably carried over by the wanderers, whoever they may have been, by whom that continent was first peopled. The manufacture of cotton must therefore be supposed to be coeval with the original settlement of America; but learned men are much divided as to the date of the invention, some carrying it nearly as high as the deluge,* and others contending for a much later period. The American manufacture may, at all events, claim a high degree of antiquity."

Whatever obscurity may rest on the origin of the manufacturing art, it is striking to observe how universally materials were, from the earliest times, distributed over the world, fit to gratify the natural propensity of man, for furnishing himself with clothing. Flax appears to have been indigenous in Egypt, and probably in other countries; the sheep is supposed to be a native of the mountainous ranges of Asia; the silkworm was given to China; and the cotton-plant to India and America.

* This is the opinion of the Abbé Clavigero. Dr. Robertson offers no opinion on this subject, owing to its extreme difficulty.

EIGHTH WEEK—SUNDAY.

THE INTELLECTUAL AND MORAL ENJOYMENTS OF HEAVEN.

THE situation in which man is placed on earth, has, in all ages, been a theme of wonder to philosophers ; and to those who are destitute of religion, an inexplicable mystery. He is formed, indeed, "wiser than the beasts of the field, and with more understanding than the fowls of heaven." The extent to which his powers and faculties have been developed by the circumstances in which he is placed, is one of those causes of astonishment, which, however the subject may be regarded by others, fills the pious mind with gratitude and adoration, while it impresses more deeply on his mind, a sense of an overruling Providence. We have seen the surprising effects of the training which man undergoes by the correspondence of the natural world to his wants, and the stimulus which it affords to his mental and bodily exertions, which convert him into an agriculturist, a manufacturer, and a mechanic ; and the further we proceed in the investigation, the more cause shall we find for admiration. But it is impossible to conceal from ourselves, that these very advantages frequently prove curses instead of blessings. We are doomed to sigh for pleasures which we cannot enjoy, to be conscious of powers which we cannot exercise, and to long for perfections which we cannot attain. We feel ourselves confined in a prison, which restrains our liberty, and contracts our knowledge ; and where we see through an obscure glass, which darkens our prospect, and excites our curiosity without gratifying it.

But revelation explains the mystery. Christ has brought life and immortality to light. By Him we are assured that this world is not our final abode, but a state of preparation for a higher existence. We are in the

childhood, as it were, of our being, when our powers and faculties are beginning to expand,—where our opening knowledge is necessarily imperfect, and our enjoyments are limited. But this "mortal shall put on immortality," and "when that which is perfect shall come, that which is in part shall be done away." "When I was a child," says an apostle, following out this illustration, "I spake as a child, I understood as a child, I thought as a child; but when I became a man, I put away childish things. For now we see through a glass, darkly; but then face to face: now I know in part; but then shall I know even as also I am known."*

There is something exceedingly sublime and glorious in this view of the eternal world. There the film which obscures our vision shall fall from our eyes. Every thing shall appear in its true light and due proportions. We shall obtain a nearer and clearer view of all that is noble, and excellent, and interesting in the universe,—of Him especially who is the Author of all, and of Him who is the Redeemer of our souls.

Let us consider this subject a little more particularly. Reason is the faculty which distinguishes man from the lower animals; but, in many respects, even in him, it is extremely limited and defective. By cultivation, indeed, it expands, and becomes more vigorous; but that very expansion only enables us to see more clearly the immeasurable distance at which we are placed from perfection; that very vigor, repressed as it is, only leads to the discovery, that any attempt to attain perfection in our present state, is utterly hopeless.

The greatest philosopher, perhaps, the world ever saw,—he whose rational powers penetrated further into the mysteries of Nature, and whose gifted eye traced the hand of God more extensively in his works than any human being had ever done before,—expressed on his death-bed an opinion of the emptiness of his own attainments, which may well be extended to all that are human, in remarkable words to this effect: "It appears to me as if I had all

* 1 Cor. xiii. 11, 12.

my life long been amusing myself like a child, in gathering a few useless pebbles and shells on the shore, while a boundless ocean lay unexplored before me. On that ocean I am now about to embark. Amidst the discoveries of that untried voyage, how utterly inadequate must my present knowledge appear."

Indeed, even if our mental powers were much stronger and more efficient than they actually are, we are not placed in circumstances capable of calling them into full exercise, or of affording them complete gratification. We cannot leave the shore, and have only "pebbles and shells" to gather. While we remain here, there are many things, of the greatest importance, which it is impossible for the acutest genius to unravel, or the highest human faculties to understand. I do not now speak of the natural objects with which we are surrounded, and yet mystery is inscribed on them all; but I particularly allude to the nature of God, and the operations of his providence. It were delightful and ennobling to feed our souls with a knowledge of the Divine perfections, but such knowledge is too vast for our feeble grasp,—"it is high, we cannot attain unto it." The very conception of an infinite, and eternal, and self-existent Being, overpowers our faculties, and shows the mind its own littleness. It were a glorious privilege to trace God in his works, and to behold his moral attributes, filling the world with perfection and happiness. But in such an employment we are, at every step, discouraged by marks of apparent disorder. Our ears are appalled with sounds of sorrow and suffering; our eyes are horrified by scenes of guilt and madness, of desolation and death. Even revealed religion gives us but a partial relief from these horrors. While it affords us the assurance that all will be well, it leaves us still in a land of darkness, and directs us to another world for light, and knowledge, and intellectual enjoyment.

It is in a future state, alone, that our reason shall be sufficiently enlarged to comprehend, and sufficiently instructed to enjoy, the attributes of God, and the operations of his providence. In the world of spirits, our views shall be more accurate, our intellect more vigorous, our

knowledge more extensive. The necessities of this mortal life shall no longer distract, nor its fleeting pleasures allure. No more pain, nor languor, nor bodily decay shall intervene to interrupt the contemplation of Divine things. The soul, emerging from its corporeal prison, shall no longer see and feel through the medium of the senses. It shall perceive more clearly, and know more certainly. Rejoicing in its new being, it shall dive into the mysteries of Nature, and remove the obscurities which perplexed, the difficulties which harassed, and the terrors which beset its earthly career. Then shall we experience the unspeakable pleasure arising from the consciousness of enlarging faculties, and from a full perception of Divine wisdom and glory. In one word, "we shall know even as also we are known."

Turning from the rational to the moral faculties of man, we find equal cause to anticipate with delight the prospect of an eternal world. It has been the complaint of devout men, in every age, that the heart is prone to wickedness,—that temptations betray it,—that passions subdue it,—that evil communications corrupt it,—that unrestrained indulgence weakens, and blinds, and brutalizes it. Yet there is nothing more certain, than that the pleasures of a good conscience form the highest of all enjoyments; and although these pleasures are not fully developed amidst the corruptions of the world, yet we are assured that they shall form the chief happiness of the celestial state.

Some good qualities of the heart, indeed, are only exercised in a state of imperfection and suffering. The personal virtues of fortitude, patience, and resignation, for example, are of this nature, as well as the social affections of sympathy and compassion. But there are other excellences which belong, not exclusively indeed, but peculiarly, to a better world. Purity and holiness, goodness and truth, while they are debased by imperfection among the children of earth, adorn with untarnished loveliness the inhabitants of heaven. The exercise of these graces in a future state must be unspeakably delightful. If, even in this world, where they are alloyed with so much imper-

fection and guilt, they attract universal admiration, and afford the noblest gratification of which the heart is susceptible, what must be their fruit in heaven, where they are without sin and remorse ; where they raise man to the dignity of angels, and cause him to resemble Him who is the personification of all human perfection,—nay, to partake of the attributes, and receive an emanation from the happiness, of the Eternal, Himself!

EIGHTH WEEK—MONDAY.

CLOTHING.—THE COTTON MANUFACTURE—ITS BRITISH HISTORY.

Passing over the history of the cotton manufacture on the European continent, in which there appears to be little to interest the general reader, I shall devote this, and some subsequent papers, to a short sketch of the art in England, which may be considered its modern birthplace, as India seems to have had the honor of its original invention.

Not more than a century ago, the cotton fabrics of India were so beautiful and cheap, that nearly all the governments of Europe thought it necessary to prohibit them, or to load them with heavy taxes, in order to protect their own manufactures. How surprising a revolution has since taken place! The Indians have not lost their former skill ; but a power has arisen in England, which has robbed them of their ancient ascendency, turned back the tide of commerce, and made it run more rapidly against the Orientals, than it ever ran against the inhabitants of Europe. I have now to trace the history of this remarkable revolution.

England was among the latest of all civilized countries to receive the cotton manufacture. That a nation which started last in the race, should have so far outstripped every competitor, may appear surprising, but admits of satisfactory explanation. Three things may be regarded

as of primary importance, for the successful prosecution of manufactures ; water-power, fuel, and iron. In one or other of these, various parts of England abound, and in some places they are nearly concentrated. This is the case with the southern part of Lancashire, and the southwestern part of Yorkshire, the former of which has become the principal seat of the cotton manufacture. In the hundreds of Blackburn and Salford, lies a tract of hills, from which issue numerous streams. In the early part of their course, these streams, descending rapidly from their sources towards the level tract on the west, form water-power adequate to turn many hundred mills, while they supply the essential element, for scouring, bleaching, printing, dyeing, and other processes of manufacture ; and, when collected in their larger channels, or employed to feed canals, they afford a superior inland navigation, so important for the transit of raw materials and merchandise. These very same hills, and the adjoining more level district, contain an almost inexhaustible supply of coal, that equally essential material, which animates the thousand arms of the steam-engine, and furnishes the most powerful agent in all chemical and mechanical operations. Of the other requisite, that of iron, Lancashire, indeed, is nearly destitute, but the neighboring districts of Staffordshire, Warwickshire, Yorkshire, Furness, and Wales, with all which it has ready communication, abundantly compensate for this deficiency. Add to all this, the neighborhood of the sea, by means of its well-situated port of Liverpool, whose commerce at once supplies its crowded inhabitants with food, and brings from distant shores the raw materials of its manufactures, while it again distributes them, converted into useful and elegant clothing, among all the nations of the earth. These advantages pointed out this district, nearly in the centre of Britain, as the peculiar seat of manufacturing enterprise. Nor must I omit to mention another convenience possessed by this locality, in the levelness of the surface, prevalent over a great extent, which affords such facilities for the canals, wherewith it is already intersected, and the more recent and more important invention of railways for loco-

motive machinery, which seems destined to supersede them.

These facilities, joined with a temperate climate, a hardy and intelligent race of men, a convenient insular position, and, above all, a government founded deep in the principles of freedom, and possessed of power to protect property, and wisdom to direct the energies, and call forth the resources of the people, form, altogether, a combination which renders the extraordinary commercial and manufacturing prosperity of Britain, nothing more than the natural result of the circumstances in which it has pleased an indulgent Providence to place her.

At what time cotton was first introduced into England, as an article of manufacture, is uncertain. The woollen and silk manufactures, especially the former, which existed at a very early date, had preceded it, and had prepared machinery which only required to be transferred to this new material. It is remarkable, that the term "cottons," had for centuries been applied to a particular kind of woollen fabric, before the produce of the cotton plant was manufactured in this country. The name had been transferred from imported cotton goods, which were imitated by the English weavers; and "Manchester cottons" had become famous, long before the raw material was known in Britain.

The first mention of true cotton manufacture is so late as the year 1641, when it is spoken of as already established in Manchester; but it had probably been gradually growing in private, and it is conjectured that the art was originally brought from the Low Countries in 1585, by the Flemish refugees, who fled from the persecutions of the Duke of Parma and the Spanish government.

At the commencement of the manufacture, the capital employed in it was small, and the progress was slow, but its extent was constantly increasing. In 1727, De Foe speaks of Manchester, as having almost doubled its population, and as containing, inclusive of all its suburbs, nearly fifty thousand inhabitants; and he adds, "The grand manufacture which has so much raised this town, is that of cotton in all its varieties, which, like all other manufac-

tures, is very much increased within the last thirty or forty years."*

In 1766, Postlethwayt, the author of the 'Universal Dictionary of Trade and Commerce,' estimated the annual value of cottons, made at Manchester, Bolton, and the neighborhood, at £600,000. The same author publishes an official return, by which it appears, that in 1749, somewhat upwards of a million and a half pounds of cotton wool were imported into Britain, and that three hundred and thirty thousand pounds were exported after being manufactured, while the remainder (one million three hundred and twenty-seven thousand pounds) were retained for home consumption. Compare this with the present imports and exports, as given officially, as follows :—

Cotton wool, imported in 1833, 303,726,199 lbs.
British cotton manufactures, exported in 1833, (real or declared value,) £18,486,400.

This amazing prosperity has been mainly owing to improved machinery, to which I shall presently advert; but it is also owing partly to an increased predilection for cotton goods, and increased habits of luxury in dress. In the year 1701, when the exportation of cotton goods did not exceed £23,000,—which appears to have been above the average for the next forty years,—the exportation of woollen goods amounted to two millions, forming above a fourth of the whole export trade of the kingdom. So great has been the change in the relative proportion of these manufactures, that whilst the woollen exports have increased only to six millions and a half, the cotton exports have reached, as has been seen, to the amazing value of eighteen millions and a half. The woollen manufacture has, indeed, continued to extend, but its rate of increase bears no proportion to that of the cotton manufacture.

If to the value of the exported goods, we add that of those consumed in the country, we shall acquire a still juster view of this manufacture, and our admiration will

* De Foe's Tour, vol. iii. p. 219.

be increased. Mr. Huskisson stated in the House of Commons, in 1824, that the real value of cotton goods consumed at home within the preceding year, amounted to £32,000,000 sterling. Of these thirty-two millions worth of goods, not more than six millions were invested in the raw material; and the remaining twenty-six millions went to the profits of the capitalist, and the income of the persons employed in the manufacture, after making various deductions for machinery, and for the amount of capital. Mr. Baines justly observes, that the rapid increase of the cotton manufacture mocks all that the most romantic imagination could have previously conceived possible, under any circumstances.

EIGHTH WEEK—TUESDAY.

CLOTHING.—THE COTTON MANUFACTURE—ITS BRITISH HISTORY CONTINUED—IMPROVEMENT OF MACHINERY.

THE cotton manufacture, though continually increasing in England, seemed destined soon to receive a check from a cause, which no means then in existence could counteract. None but strong goods, such as fustians and dimities, were made in England, so late as the middle of the last century, and for these, the demand must always have been limited. Yet the demand exceeded the supply, and the modes of manufacture were such as greatly to impede the increase of the production. The weaver was continually pressing upon the spinner. The processes of spinning and weaving were generally performed in the same cottage, but the weaver's own family could not supply him with a sufficient quantity of weft, and he had to collect it with much pains from neighboring spinsters. Thus his time was wasted, and he was often subjected to high demands for an article, on which, as the demand exceeded the supply, the seller could put his own price. A high and sustained price of yarn would indeed have attracted new hands to the employment, but such high

price would itself have tended to keep down the rising manufacture, by making the goods too costly, in comparison with other articles of clothing.

This difficulty was likely to be further aggravated by the invention of the *flying shuttle*, one of the first British improvements in the process of weaving. This simple contrivance was a great saving of time and exertion to the weaver, and enabled one man to weave the widest cloth, which had before required the united exertions of two persons.

The art of spinning, as practised at the time I am now speaking of, was a very slow process. The only machine then made use of was that of the one-thread wheel, which may still be seen to occupy the chimney-corner of the thrifty housewife ; a machine much superior, indeed, to the clumsy teak-wood wheel used in India, but still a very imperfect piece of mechanism. Genius stepped in to remove the difficulty, and gave wings, as Mr. Baines emphatically expresses it, to a manufacture which had been creeping on the earth. A mechanical contrivance was invented, by which twenty, fifty, a hundred, or even a thousand threads, could be spun at once by a single pair of hands !

Into the details of this invention, and of the various steps by which it was perfected, till it gave rise to that astonishing Factory System, by which Britain has been rendered the manufacturing emporium of the world, I must not enter. Yet it is too intimately connected with our subject, and exhibits, in too interesting and striking a light, the progressive developement of human ingenuity, as connected with the profound arrangements of Creative wisdom, to be passed over altogether in silence.

The want to which I have alluded, as regarded the spinning art, seems, about the time of which I now speak, to have called forth the inventive powers of several ingenious men ;* but those to whom the world is

* We learn from the Transactions of the Society for the Encouragement of Arts, &c., that in 1783, that Society had in its repositories models of the following spinning machines :—" A spinning-wheel, by Mr. John Webb, invented 1761 ; a spinning-wheel, by Mr. Thomas

indebted for the inventions, the principle of which has been so successfully reduced to practice, are James Hargreaves, a weaver of Standhill, near Blackburn, who produced the spinning-*jenny;* John Wyatt and Lewis Paul, manufacturers of Birmingham, who gave rise to the art of spinning by *rollers;* Richard Arkwright, (afterwards Sir Richard,) a native of Preston, bred to the business of hair-dressing, whose inventive genius and unrivalled sagacity enabled him to arrange a complete series of machinery of the most admirable construction; and Samuel Crompton, a weaver, near Bolton, who combined the machines of Arkwright and Hargreaves, and thus took a new step towards the perfection of manufacturing mechanism.

Many improvements have been made by the successors of these ingenious men, but to them seems due the praise of those original inventions in mechanism, to which is owing the prosperity of British manufactures. To these must be added the no less extraordinary inventions connected with the application of steam as a moving power, which are of too great importance not to require a separate consideration. Mr. Baines thus forcibly sums up his detailed account of these wonderful improvements.

"Little more than sixty years since, every thread used in the manufacture of cotton, wool, worsted, and flax, throughout the world, was spun singly by the fingers of the spinner, with the aid of that *classical* instrument, the domestic spinning-wheel. In 1767, an eight-handed spinster sprung from the genius of Hargreaves; and the *jenny*, with still increasing powers, made its way into common use, in spite of all opposition. Two years afterwards, the more wonderful invention of Wyatt, which claims a much earlier origin, but had disappeared, like a river which sinks into a subterraneous channel, and now rose again under the fortunate star of Arkwright, claimed yet higher admiration, as founded on principles of more

Perrin, 1761; a horizontal spinning-wheel, by Mr. William Harrison, 1764; a spinning-wheel, by Mr. Perrin, 1765; a spinning-wheel, by Mr. Garrat, 1766; a spinning-wheel, by Mr. Garrat, 1767."—Vol. i. pp. 314, 315.

extensive application. Five years later, the happy thought of combining the principles of these two inventions, to produce a third much more efficient than either, struck the mind of Crompton, who, by a perfectly original contrivance, effected the union. From twenty spindles, this machine was brought, by more finished mechanism, to admit of a hundred spindles, and thus to exercise a Briarean power. Kelly relinquished the toilsome method of turning the machine by hand, and yoked to it the strength of the rapid Clyde. Watt, with the subtiler and more potent agency of steam, moved an iron arm that never slackens nor tires, which whirls round two thousand spindles in a single machine. Finally, to consummate the wonder, Roberts dismisses the spinner, and leaves the machine to its own infallible guidance. So that, in the year 1834, several thousand spindles may be seen in a single room, revolving with inconceivable rapidity, with no hand to urge their progress, or to guide their operations; drawing out, twisting, and winding up as many thousand threads, with unfailing precision, indefatigable patience, and strength; a scene as magical to the eye which is not familiarized with it, as the effects have been marvellous in augmenting the wealth and population of the country."*

The spirit of improvement, which carried the spinning machinery to so high a degree of perfection, was next directed to the weaving department, and did not rest till that operation was also performed by machinery. A loom, moved by water-power, had been contrived by M. de Gennes, so far back as the seventeenth century, and is described in the 'Philosophical Transactions of the Royal Society' in 1678. This machine does not, however, appear to have succeeded, and several subsequent attempts were equally unfortunate in their practical results, owing to the necessity of dressing the warp as it unrolled from the beam, which operation required a man to be employed for each loom, so that there was no saving of expense. This difficulty was happily removed by

* Baines on the Cotton Manufacture, pp. 211—213.

the invention of an extremely ingenious and effectual mode of dressing the warp *before* it was placed in the loom, which was first applied to use in 1803. The progress of the power-loom, as it is called, though slow at first, has lately very much increased; and, in 1833, there were believed to be not fewer than a hundred thousand power-looms in Great Britain, by far the greater part of which were employed in the manufacture of cotton. The hand-loom weavers in this manufacture, are estimated at two hundred and fifty thousand.

I cannot more appropriately conclude this sketch than in the words of an eloquent foreigner, who has paid a just tribute to British skill and industry:—"Watt improves the steam-engine, and this single improvement causes the industry of England to make an immense stride. This machine represents, at the present time, the power of three hundred thousand horses, or of two millions of men, strong and well fitted for labor, who should work day and night, without interruption, and without repose, to augment the riches of a country, not two-thirds the extent of France. A hair-dresser invents, or, at least, brings into action, a machine for spinning cotton; this alone gives to British industry an immense superiority. Fifty years only after this great discovery, more than one million of inhabitants are employed, in those operations which depend directly or indirectly on the action of this machine. Lastly, England exports cotton, spun and woven, by an admirable system of machinery, to the value of four hundred millions of francs yearly. The Indies, so long superior to Europe—the Indies, which inundated the West with her products and exhausted the riches of Europe—the Indies are conquered in their turn. The British navigator travels in quest of the cotton of India; brings it from a distance of four thousand leagues; commits it to an operation of the machine of Arkwright, and of those that are attached to it; carries back their products to the East, making them again to travel four thousand leagues;—and, in spite of the loss of time, in spite of the enormous expense incurred by this voyage of eight thousand leagues, the cotton, manufactured by the

machinery of England, becomes less costly than the cotton of India, spun and woven by the hand, near the field that produced it, and sold at the nearest market. So great is the power of the progress of machinery."*

EIGHTH WEEK—WEDNESDAY.

CLOTHING.—THE COTTON MANUFACTURE—ITS BRITISH HISTORY CONTINUED—INTRODUCTION OF STEAM POWER.

THE application of the powers of steam to the purposes of manufacture was a very peculiar and important step in the progress of the art; and it is remarkable, that the patent which secured to the ingenious improver of the steam-engine the profits of his ingenuity, was taken out in the very same year as that which appropriated to Arkwright the advantages of his invention in the spinning-machine. So simultaneous was the impulse which called forth talents, that, though exerted in very different departments, were destined to combine their powers in perfecting a system which was rapidly to advance the prosperity of Great Britain.

Amazing as was the progress which had taken place in the cotton manufacture, prior to 1790, it would soon have found a check upon its further extension, if a power more efficient than water had not been discovered to move its machinery. The building of mills in Lancashire must have ceased, when all the available fall of the streams had been appropriated. The manufacture might, indeed, have spread to other counties, as it has done to some extent; but it could not have flourished in any district, where coal, as well as water, was not to be found; and the diffusion of the mills over a wide space would have been unfavorable to the division of labor, the perfection of machine-making, and the cheapness of conveyance. The improvement of the steam-engine, hap-

* Address of M. Charles Dupin to the Mechanics of Paris.

pily, supplied the desired power; which, though not an invention of that age, was then first made of great and extensive utility, by the genius of James Watt.

The first thought of employing the expansive force of steam as a mechanical power, is believed to have been entertained by Solomon de Caus, engineer to Louis XIII., who proposed the raising of water by steam, as a philosophical principle, in a book written in 1615. In 1630, Charles I. granted a patent to David Ramsaye, a groom of the Privy Chamber, for nine articles of invention, two of which seem to indicate the origin of the steam-engine, viz., "To raise water from low pits by fire," and "To raise water from low places, and mines, and coal-pits, by a new way never yet in use."* These facts deprive the Marquis of Worcester of the honor, generally ascribed to him, of having first applied steam as a mechanical power. In the 'Century of Inventions,' published by that eccentric nobleman in 1663, there is the most distinct statement of the power of steam, which he had proved by its bursting a cannon, and had applied to the producing of fountains ejected forty feet high. The first person who constructed a machine, in which steam was successfully turned to purposes of usefulness, was Captain Savery, who obtained a patent for his invention on 25th July, 1698. This engine, though very ingenious, had many defects. It was, however, afterwards considerably improved and simplified, but was not in a state to be applied to general use, till it came under the hands of the ingenious Watt.

Mr. Watt was a native of Greenock, and settled in Glasgow, as a maker of philosophical instruments, in 1757. He was appointed instrument-maker to the University, and thus became acquainted with Dr. Black, then professor of medicine, and lecturer on chemistry in that University, who about this time published an account of his important and interesting discovery of latent heat. The knowledge of this discovery led Watt to reflect on the prodigious waste of heat in the steam-engine then in

* Rymer's Fœdera, vol. xix. p. 139.

use, where steam was used merely for the purpose of creating a vacuum in the cylinder under the piston, and for that end, was condensed in the cylinder itself, the piston being then forced down solely by atmospheric pressure. The cylinder was thus alternately warmed by the steam, and cooled by the admission of cold water, to condense it ; and the necessary consequence of this process was a profuse expenditure both of heat and of the fuel which produced the steam.

It happened that Watt was employed, in the year 1763, to repair a small working model of Newcomen's steam-engine, for Professor Anderson. He saw its defects, and studied how they might be remedied. He perceived the vast capabilities of an engine, moved by so powerful an agent as steam, if that agent could be properly applied. His scientific knowledge, as well as his mechanical ingenuity, was called forth. All the resources of his sagacious and philosophical mind were devoted to the task ; and, after years of patient labor and costly experiments, which nearly exhausted his means, he succeeded in removing every difficulty, and making the steam-engine the most valuable instrument, for the application of power, which the world has ever known.

Three great improvements which Watt made in the steam-engine, are thus briefly described :—1st, The condensation of the steam in a separate vessel ; this increased the original powers of the engine, giving to the atmospheric pressure, and to the counter-weight, their full energy, while, at the same time, the waste of steam was greatly diminished. 2d, The employment of steam-pressure, instead of that of the atmosphere, by the admission of steam alternately above and below the piston ; this accomplished a still further diminution of the waste, and was fertile in other advantages. The third improvement was the double impulse, which may be considered as the finishing touch given to the engine, whereby its action is rendered nearly as uniform as that of the water-wheel.

After Mr. Watt had thus perfected the steam-engine, so as to adapt its mechanism to the production of a rotative motion, and the working of machinery, it was some

time before it came into general use in manufacturing operations; but as soon as it was adopted as part of the factory system, it gave a prodigious additional impulse to a branch of industry, which had already arrived at a great pitch of prosperity, by means of the spinning machinery. "The steam-engine," says Mr. Baines, "stands in the same relation to the spinning machines, as the heart does to the arms, hands, and fingers in the human frame; the latter perform every task of dexterity and labor; the former supplies them with all their vital energy." A French writer has drawn a still closer parallel between the animal mechanism and that of the steam-engine. "Heat," says he, "is the principle of its movement. It makes, in its different operations, a circulation like that of the blood in the veins, having valves that open and shut opportunely; it feeds and evacuates itself at proper intervals, and derives from its labor all that is necessary for its subsistence."*

[To the foregoing papers on the British history of the cotton manufacture, the Editor has the satisfaction of appending the following notices of its American history, drawn up and placed in his hands by Dr. Elisha Bartlett of Lowell.

"The annals of the cotton manufacture in the United States would present many of the same great outlines, which distinguish its British history. From its feeble infancy, here as there, it has rapidly advanced, against various obstacles, and through many reverses, to its present immense extent and prosperous condition. The number and importance of the mechanical inventions and improvements made in this country, have been vastly less than those made in Britain; and the obstacles to the introduction of labor-saving machinery which have frequently been so great there, have never been experienced here; but the results of American ingenuity in this department of skill have been neither few nor trifling; and the difficulties, of one kind and another, with which the manufacture has had to struggle, have hardly been less on this side the Atlantic than on the other.

"The spinning of cotton in this country by Hargreaves'

* Beledor, Architecture Hydraulique.

jennies, was commenced in the State of Massachusetts. In 1790, the General Court of that State passed an act for the purpose of encouraging and aiding a manufacturing company who had, three years before, in 1787, set up a cotton-mill in the town of Beverly. In 1786, two Scotch mechanics, brothers, by the name of Barr, were employed by Mr. Orr, of East Bridgewater, to erect machines for carding, spinning, and roping. Encouragement was extended to these mechanics, also, by the Legislature of the State. The first loom was put in operation on the 12th of April, 1788, at Philadelphia. In November, 1789, Mr. Samuel Slater, then but little more than twenty-one years old, and who had been in the employment of Jedediah Strutt, Esquire, arrived in the United States from England. In 1790 and 1791, Mr. Slater, aided by Moses and Smith Brown, and William Almy, of Providence, Rhode Island, introduced the Arkwright machinery at Pawtucket, on the Blackstone river, four miles from Providence. From this period may be dated the successful introduction into America of the cotton manufacture. Mr. Slater commenced the cotton spinning with a single water-frame of twenty-four spindles, and he lived to see the business which he had thus commenced, taken up and extended from these small beginnings, till it created by the side of almost every waterfall in Rhode Island, and through many portions of all the other New England States, an active and flourishing community,—adding to the wealth, stimulating the enterprise and industry, promoting the comfort, and improving the mental and moral condition of the country.

"We are unable to state, with any considerable degree of accuracy, the present actual extent of the cotton manufacture in the United States. A very large proportion of it is carried on in small establishments, although there are several of considerable magnitude. A statement of some of the aggregate results in one of these latter may not be uninteresting in itself, while it will serve to illustrate the rapidity with which this branch of domestic industry has been advancing within the last fifteen or twenty years. In 1823, the first cotton-mill was put in operation on the Paw-

tucket falls of Merrimack river, in that part of the town of Chelmsford, which is now included in the city of Lowell. On the 1st of January, 1839, the amount of capital invested in the several kinds of manufacture there carried on, most of which are of cotton, was *nine millions of dollars*. The number of spindles in operation, was 163,404; the number of looms, 5094; the number of yards of cloth annually manufactured, was 55,185,000; the number of pounds of cotton consumed, was 18,059,600; the number of females, alone, employed in the mills, was *six thousand four hundred and seventy!*

"One of the most important inventions ever made, connected with the cotton manufacture, was that of the cotton-gin, a machine for cleaning the cotton from its seeds. The author of this invention was Eli Whitney, a native of Westborough, in the State of Massachusetts. Mr. Whitney was a man of great invention and mechanical genius, and of extraordinary and untiring perseverance. He conceived the plan of his machine, and constructed one with his own hands, during the winter of 1792–3, while a resident at Savannah, Georgia, in the hospitable mansion of Mrs. Greene, the widow of General Greene of the Revolution. Before the use of the gin, the labor of separating the seed from the cotton was so great, as to prevent, almost entirely, the cultivation of this staple in our Southern States. Cleaning one pound of cotton from the seed was a day's work for a woman. Mr. Whitney's machine was immediately and perfectly successful; and in his own language, contained in his indignant remonstrance to the legislature of South Carolina, '*enabled one man to perform the work of a thousand.*'

"The culture of cotton in the United States has, since that time, more than kept pace with its manufacture. From a letter of Mr. Woodbury, Secretary of the Treasury, communicated to Congress in April, 1836, it appears, that the quantity of raw cotton, raised in the United States in 1789, was about one million pounds. In 1815, it amounted to *one hundred* millions of pounds; and in 1834, it had reached the enormous quantity of *four hundred and sixty* millions of pounds, making about one half of all the cotton raised in the world." Am. Ed.]

EIGHTH WEEK—THURSDAY.

CLOTHING.—THE WOOLLEN MANUFACTURE—ITS BRITISH HISTORY.

THE manufacture of wool, as it was probably among the first established in the world, so it was certainly more early than any other introduced into Britain. It was known in that country so far back as the period when the Romans were in possession of it. That remarkable people, who carried the arts of civilized life in the train of their arms, having persuaded the rude and savage inhabitants of the island, not only to exchange the skins in which, when they used any dress, they had been hitherto clothed, for the more comfortable attire of their conquerors, but also to turn their attention to the art of weaving, a manufacture was established at Winchester, of sufficient magnitude to supply the Roman army; and there is reason to believe that, as long as the Romans remained in possession of the country, the manufacture was continued. From the period of their quitting it, till the commencement of the tenth century, there are no evidences, either direct or indirect, by means of which we can judge of the state of this manufacture; but, at the latter period, from the prices of wool, which are mentioned as the current rate of the fleece, there is reason to suppose, that this article was cultivated with considerable attention. The demand for fine cloth, which seems to have been pretty general among the nobility, during the reign of Henry II., led to the introduction of Spanish wool; but this was soon prohibited by a statute which was framed for the encouragement of the British farmer, and the improvement of his wool. About the year 1240, the importation of fine cloth began to be encouraged; the consequence of which was, that English wool, being in some measure deprived of the home market, was sent to Flanders, where it was manufactured.

This kind of traffic subsisted nearly a hundred years without interruption, till, about the year 1330, the Eng-

lish began seriously to encourage the manufacture of woollens among themselves ; and the mode which they adopted for the purpose, displays a liberal and sound policy, very creditable to the times. Sensible of the superior expertness of the Flemings, they tempted them to come over and settle in their country.

From this period, the history of the manufacture remains for some time in a state of obscurity. That it materially suffered by the injudicious interference of an ignorant government, there can be no doubt. Not only did the legislature prohibit the exportation of the raw material, but they limited by name the towns, both in the north and west of England, in which it was to be carried on. The manufacture, however, was now so firmly established, as not to be easily destroyed. It not only maintained itself, but in 1614 underwent, in the west, a great improvement by the invention of what is called medley, or mixed cloth, for which Gloucester is still famous.

At the end of the seventeenth century, the total annual manufacture of woollens was estimated at eight millions value in pounds sterling. In the year 1770, as has been proved by documents laid before Parliament, the exports which, at the beginning of that century, amounted to somewhat more than two millions, had increased to four millions. I do not know what was the amount of the home consumption at that time ; but thirteen years afterwards, I found the whole produce of the woollen manufacture rated at nearly seventeen millions.*

There are two grand seats of the woollen manufacture in England, where natural facilities exist for particular branches of the trade, namely, the West Riding of Yorkshire, and the counties of Gloucester, Wiltshire, and Somersetshire. In the former of these localities, as well as in some other places, it is interesting to remark, that

* [Although the manufacture of woollen goods in the United States, is not to be compared in extent with our cotton manufacture, it is yet of very great and increasing importance. The value of the domestic *clip* or fleece, of the year 1839, has been estimated at from twenty to thirty millions of dollars.—Am. Ed.]

there still remain some traces of the original state of the woollen manufacture, in what is called the domestic system. According to this system, the manufacture is conducted by a number of master-manufacturers, generally men of small capital, who, besides carrying on their manufacture of woollen cloth, have small farms of a few acres, partly for the support of their families, and partly for the convenience of their manufacture.

The introduction of expensive machinery, and the employment of large capital in the manufacture, has greatly circumscribed the operation of this system; and without doubt, it will finally yield to the greater pecuniary advantages of the factory system. The relative benefits of the two modes of operation, considered in a mercantile light, formed a subject of investigation by a Committee of the House of Commons, in 1806, who found that there were circumstances of superiority on both sides. In a moral point of view, the domestic system is undoubtedly preferable; though, as applied to the woollen trade, the factory plan is not so dangerous to the morals of the people employed, as when applied to the cotton trade.

It is exceedingly distressing to think, that the factory system, on which the pecuniary and commercial prosperity of the community so essentially depends, should, in its present state, have a direct and almost necessary tendency to vitiate the morals, and injure the health of those who are employed in it. This, however, is undeniably the case; and it is a truth which cannot fail to damp the pleasure of every good man, in reflecting on the prosperity of a great manufacturing country, that the further the enterprise of the people is carried, and the more their pecuniary capital is extended, the more demoralizing appear to become the effects on the manufacturing community.

This reflection forces itself on the mind, in comparing the condition of the population in the woollen districts of England, where the factory system is but partially established, with that of the population in the cotton districts where it is fully developed. In the former, exist many of the comforts and feelings of domestic life; the habits and manners of the manufacturing classes are sober, de-

cent, and regular; they seem to have an interest and delight in keeping up the respectability of their character, in setting a good example to their children, and in bringing them up in the paths of piety and virtue. Even before a traveller has time or opportunity to ascertain these facts, he is struck with the cleanliness and neatness of their dress and persons, with the healthiness of their looks, and with their steady and cheerful manners.

Let the same individual pass into the cotton district, and he will find the case most miserably reversed. The manufacturing classes are dirty, squalid, and unhealthy, having an appearance of debauchery and poverty strongly marked in their persons. Nor will this appearance be found on inquiry to be erroneous. The utmost ignorance and dissoluteness of manners prevail. There is, generally speaking, none of that laudable feeling of independence; none of that prospective prudence; above all, none of that religious principle,—without which, the working classes must always be sunk in poverty and vice.

The causes of this remarkable difference do not lie deep; but I can at present merely hint at them. They are all comprised in the extension of the factory system, without a corresponding extension of the means of religious instruction; or, rather, with a tendency in the system itself to preclude all the ordinary means of mental improvement. The early introduction of children into crowded factories, where confinement injures their health, and intercourse with depraved characters contaminates their morals, while the wholesome education of the school is thrown aside; and the inequality of the rate of wages among workmen, occasioned by the fluctuations of commerce, which sometimes afford them a profuse supply, and at other times reduce them to a state of starvation, (circumstances by which the cotton is distinguished from the woollen trade, in the latter of which the demand is more steady, and children are not useful to the same extent in their childish years,) are themselves fruitful causes of ignorance and depravity; and are, at the same time, indirectly productive of accumulating evils by causing the neglect of those moral influences, on which so

much of the happiness of the community depends. But these are not necessary concomitants of manufacturing operations; and my dependence on the great overruling principle of good is such, that I do not doubt the mischief will eventually correct itself; or, rather, will be corrected by what is usually called the natural progress of society, but is, in reality, no other than a fuller developement of the plans of a beneficent Providence. The depraving effects of the factory system are already begun to be felt as an intolerable evil. The case has attracted the attention of the British legislature, and some steps have been taken to discover a remedy. But it does not yet appear to have reached that point, in its downward progress, where it is destined to stop. Some further dissoluteness of morals will probably take place, before the public attention shall be thoroughly and effectually roused. The day, however, I confidently anticipate, will come; and then, by arrangements founded on Christian principle, in which the system has hitherto been most lamentably deficient, a revolution will be effected, which shall exhibit a truth proved in a thousand other instances, in the moral as well as in the natural world, that an unseen Hand is constantly at work,

> "From seeming evil still educing good,
> And better thence again, and better still,
> In infinite progression."

[If we turn from the deplorable picture given above, of the moral condition of the population engaged in the cotton manufacture in England, to the actual state of the population similarly engaged in the United States, we shall be struck with a contrast like that of light with darkness. It will be seen, that the evils which unquestionably exist *there*, and which grieve the heart of humanity to think of, do not exist *here* at all; and therefore, that they do not necessarily belong to, that they are no inseparable part of, the cotton-manufacturing system. It is not pretended that our manufacturing communities are immaculate; but it is asserted, that their morals are as fair as can be exhibited by any other large class of people, in any

condition, in town or country. In Lowell, for instance, which was created, and is now supported, by the cotton manufacture, they who are best acquainted with its condition, are ready to declare on their responsibility, that the tone of morals is as pure and high, the schools are as good, the churches as well attended, as in any other place of the same size in the Union. This happy state of things is owing in part to the previous character of the people now engaged as operatives ; and in part to the care which the directors of the works have always exercised over the moral condition of those whom they have employed. Young women come from the neighboring country, to make a little independence by their labor ; and having made it, either return to their rural homes, or marry in the town, and become respectable wives and mothers of families. The men often own the houses they live in, and sometimes are holders of stock in the several manufacturing companies. The children go to school till they are twelve years of age, and till that time do not enter the factories at all ; nor do they entirely leave school till they are fourteen. Health, intelligence, virtue prevail, and competence and self-respect are secured. There is no present fear of any deterioration in the happy character of this population. Long may it be preserved, under the good hand of God !—as long as rivers shall flow, and man shall toil for his fellow man ! Am. Ed.]

EIGHTH WEEK—FRIDAY.

CLOTHING.—THE ART OF BLEACHING.

There is nothing so peculiar in the modern history of the *linen* manufacture, or in the nature of the process, as to require a detailed account. The machinery used in weaving, is nearly the same as that described in the other manufactures already mentioned ; and I have elsewhere given a sufficient description of the flax-plant itself, of the mode of its cultivation, and of the early history of the

manufacture. I shall, therefore, pass at once to a process which flax undergoes, in common with the other vegetable substances used in manufacture ;—I allude to the art of bleaching.

Such substances are naturally combined, in a greater or less degree, with resinous matter, which communicates color to the fibre, and diminishes its brilliancy. Bleaching is the art by which this matter, or any accidental stain, is removed, and the pure vegetable fibre is left to reflect the different rays of light in due proportion, so as to appear white.

In regard to the origin of this art, it would soon be observed, that the action of water, together with that of the sun and air, rendered the rude cloths whiter than at their first formation ; and, since the earliest step towards refinement is to add beauty to utility, as the state of society improved, a desire to give them a pure and spotless white would naturally arise. An idea which seems to have been very early entertained, that white raiment was an emblem of innocence, may probably have given a stimulus to the experiments which led to the discovery of the bleaching process. Accident, too, would assist the discovery ; for it would be found, that a certain degree of putrid fermentation carried off coloring matters from vegetable fibres. The practice of macerating cloth in water mixed with putrescent animal matter, has been continued from the earliest times to the present day.

From the most ancient accounts handed down to us of India, Egypt, and Syria, it appears that these enlightened nations knew the efficacy of natron, (the nitre of Scripture,) an impure mineral alkali found in these countries, for combining with, and carrying off, the coloring matter with which cloth is stained ; and, being still found in great abundance by the present inhabitants, it is used by them for the same purpose. We are also informed by Pliny,* that the ancient Gauls were acquainted with the use of a lixivium or ley, extracted from the ashes of burnt vegetables, as a detergent, and knew how to combine this lixivium with animal oil, to form soap.

* Book xviii. chap. 21.

But, though these nations appear to have early acquired some knowledge of the art of bleaching, the progress which they made in its improvement, when compared with the advantages which some of them enjoyed, was very inconsiderable. The same practices appear to have been handed down, from one generation to another, without any material alteration. In India, the art of bleaching, as well as that of staining cloths of various colors, does not seem to be in greater perfection at present, than it is described to have been in the days of Herodotus. Even in Europe, where the arts, after they have been introduced, have generally made rapid progress, the art of bleaching advanced very slowly till towards the end of the eighteenth century, when chemistry first began to be extensively applied to the improvement of the arts.

In the middle of that century, the process occupied from six to eight months. It consisted in steeping the cloth in alkaline leys for several days, washing it clean, and spreading it on the grass for some weeks. The process of alternate steeping in a ley, and bleaching on the grass, was repeated for five or six times. The cloth was then steeped for some days in sour milk, washed clean, and once more exposed on the grass.

This tedious process was at once curtailed to that of a single day, by the application of the oxymuriatic acid, or chlorine, the properties of which were discovered by the justly celebrated Mr. Scheele. While employed in making experiments on manganese, about the year 1774, this philosopher first noticed the powers of that agent in rendering vegetable substances colorless, and stated the fact, in 1786, to M. Berthollet, more as a matter of curiosity than of use. This intelligent Frenchman lost no time in employing the properties of the curious and interesting substance, for the most important practical purposes. His application of it to the bleaching of cotton and linen cloth proving successful, he published the result of his experiments in the year 1789. The new method of bleaching was quickly and successfully introduced into the manufactories of Rouen, Valenciennes, and Courtray, and soon after into those of Manchester and Glasgow;

and it has since been generally adopted in Great Britain, Ireland, France, Germany, and the United States. The advantages which result from this rapid method of bleaching, can be best appreciated by commercial people, who experience its beneficial effects in many ways, but particularly in the quick circulation of their capitals.

Great difficulties at first impeded the progress of this improvement, arising chiefly from prejudice, as well as from the ignorance of the bleachers in the chemical processes. These obstacles, however, were soon removed, by the assistance of several eminent chemists, particularly Messrs. Watt, Henry, and Cooper.

From the volatility of the oxygen as united with the muriatic acid, when simply diffused in water, with which it has a very slight affinity ; and, consequently, its unequal action on the goods immersed in it ; as well as from its suffocating effects on the workmen employed, it soon became evident, that the application of it, in any extensive degree, would be impracticable if these inconveniences were not removed. Various attempts were made to effect this ; and since it has been effected, several persons have put in their claims as inventors of so useful an improvement. Mr. Higgins of Dublin, and M. Berthollet, had both combined the oxymuriatic acid with potash, so early as the year 1788. The knowledge of this having been done by the latter, and of the fact that the acid was thus deprived of its offensive smell, induced the bleachers at Javelle, in France, to add a solution of caustic potash. Hence the oxymuriatic acid, combined with an alkali, is usually known by the name of the Javelle liquor.

No further improvements seem to have taken place, in the combination of this acid with any other substance than the alkalis, until the year 1798, when Mr. Charles Tennant of Glasgow, by a well-conducted series of experiments, showed that it was capable of being united with what are called the alkaline earths, such as barytes, strontitis, and lime. This discovery is of great importance, and may indeed be said to make a new era in the history of bleaching ; as by means of so common and cheap a substance as lime, the full effect of the oxymu-

riatic acid is communicated to the cloth, and great saving is effected by its substitution in place of an alkali.*

In the bleaching of flax and hemp, Berthollet made some experiments, which succeeded in giving to their fibres the whiteness and softness of cotton. He subjected them to the action of chlorine, which bleached them effectually; but, at the same time, it injured their fibre; and although a thread was produced of considerable tenacity, yet the shortness of the staple was such as to render the spinning a troublesome operation. It was found that this process had the remarkable property of reducing the finest flax, and the coarsest hemp, alike to one uniform fineness of fibre and color, and that even the refuse from ropewalks might thus be made into a substance valuable in the arts.†

EIGHTH WEEK—SATURDAY.

CLOTHING.—THE ART OF DYEING—ITS ORIGIN AND ANCIENT HISTORY.

THE perception of color seems to be accompanied with immediate pleasure; and though the effect is probably heightened by association, it is so instantaneously produced, that we are only conscious of the pleasing emotion, and seldom think of searching beyond it for the source of our delight. Long before we are capable of analyzing our feelings, the eye is caught with the brilliancy of color and the splendor of illumination. Some, even of the lower animals, seem not to be altogether insensible to the beauties of rich and variegated tints; and man, in his rudest state, has always regarded color as a principal constituent of ornament. Nor is it only in the judgement of the infant or the savage, that colors rank high among the elements of beauty. In the most refined periods of human society, they retain their attraction; and although, to a cultivated taste, the pleasure depends

* See Edinburgh Encyclopedia, article—Bleaching.

† Nicholson's Journal, vol. vi.

on blending and harmonizing, rather than on brilliancy and strong contrasts, which seem to afford the first enjoyment, this refinement rather increases than diminishes their influence.

"Among the several kinds of beauty," says Addison, "the eye takes most delight in colors. We no where meet with a more glorious or pleasing show in Nature, than what appears in the heavens at the rising and setting of the sun, which is wholly made up of those different stains of light, that show themselves in clouds of a different situation. For this reason we find the poets, who are always addressing themselves to the imagination, borrowing more of their epithets from color, than from any other topic."*

To this delight, which we derive from the perception of colors, must be referred the origin of dyeing. The savage would naturally wish to appropriate, and to have constantly in view, what afforded him so much pleasure. Vanity might induce him to adopt some colored substance as a personal ornament, or to employ it in giving beauty to the furniture of his rude dwelling. His fondness for brilliancy, or variety, would prompt him to make trial of different substances; and though many of his experiments, as they would be guided by no fixed principle, might fail, some of them would succeed, and thus gradually lead to the discovery of useful dyes. Perseverance would supply the place of knowledge, and accident would sometimes disclose, what experiment might never have found out.

These remarks may even be applied to the art, after it had attained a more advanced state, and when it might have been expected that science would have lent greater assistance to a subject so susceptible of improvement, by inductive investigation. It has often been remarked, however, and not without reason, that almost every important discovery in the arts has been the offspring of accident, and that science has done little more than suggest hints for improving what chance may have offered to human observation.

* Spectator, No. 412.

That the art of dyeing originated before the period of authentic history, there can be no doubt. I have already observed, that it was known so far back as the time of Moses, and indeed two hundred years before his day, during the youth of Joseph; and it is worthy of remark, that even in those early days, the colors which were made use of indicated a considerable progress in the art. In India, too, the process was certainly known at a very remote period. The natural fertility of the soil of that country, and the great variety of materials which it affords for dyeing, were extremely favorable to its improvement. But religious prejudices, and the unalterable division into *castes*, soon imposed restraints on ingenuity. The arts became stationary; and it would seem, that the knowledge of dyeing cotton was as far advanced, when Alexander the Great invaded the country, as it is at present. Even at this day the Indian processes are so complicated, tedious, and imperfect, that in any other country they would be impracticable, like their mode of weaving, on account of the price of labor. European industry has far surpassed them in correctness of design, variety of shade, and facility of execution; and if, in the liveliness of two or three colors, we are inferior to them, this is solely to be ascribed to the superior quality of some of their dyes, or perhaps to the length and multiplicity of their operations.*

The Egyptians do not seem to have made any important additions to the art of dyeing; and, indeed, little could be expected from the genius or industry of a people, who were strictly prohibited, by the principles of their religion, from changing even their most indifferent customs. It appears, however, from Pliny, that they were acquainted with a mode of dyeing, very much resembling our modern calico-printing. He mentions, that the Egyptians began by painting on white cloth, with certain drugs, which, in themselves, possessed no color, but had the property of attracting or absorbing coloring matters; that these cloths were afterwards immersed in a heated

* See Berthollet.

dyeing liquor, of a uniform color; and yet, when removed from it, soon after, that they were found to be stained with indelible colors, differing from one another, according to the nature of the drugs, which had been applied to different parts of the stuff.*

The Tyrian purple has already been mentioned, and I need only add, that the art of producing it was for centuries lost, in consequence of the restrictions which imperial pride placed on the use of it. The Roman emperors appropriated this color entirely to themselves, and denounced the punishment of death against those who should presume to wear it. This tyrannical restriction so limited the dyeing of the purple, that, with the imperial throne, the process itself was lost. In the twelfth century, neither the shellfish, which furnished the dye, nor the methods which the ancients employed to communicate to cloths the rich and beautiful purple which it afforded, were at all known. At a later period, however, the material of the dye was again discovered. Cole, in the year 1686, found some shellfish, on the coast of England, which yielded it. Reaumur detected it in the whelks† which he obtained on the coast of Poitou; and Duhamel, in a shellfish, produced in great abundance on the coast of Provence. It has been discovered, also, in South America, in the Antilles, and on various shores of the Mediterranean; and there is reason to believe, that it exists in as great plenty now, as it did in the days of the ancients. If this dye, therefore, is not used in our day, it is because we are acquainted with more beautiful, as well as less expensive colors for the art.

The Greeks and Romans made but little progress in the art of dyeing. Public opinion, among them, placed the fine and the useful arts at an immense distance from each other; for, while the highest honor was connected with the former, the latter were degraded among the dishonorable and servile employments. This prejudice,

* Pliny, book xxxv. chap. 2.

† [The *Buccinum undatum*, found also on our New England coast, is called the whelk in England.—Am. Ed.]

which well accounts for the small improvement made by these otherwise active and ingenious nations, in many of those employments that have made such rapid advancement in our own days, forms a remarkable contrast between ancient and modern times. The philosopher of our day does not affect the distant and austere habits of the sages of antiquity. He mixes freely in society, and does not disdain to derive information from whatever Nature or art may offer to his observation. The instruction he has received from the artist, has been amply repaid by the light which science has shed on the arts, and the explanations it has afforded of their various processes.*

NINTH WEEK—SUNDAY.

THE SOCIAL AND RELIGIOUS ENJOYMENTS OF HEAVEN.

THE intellectual, and perhaps also the moral powers, might be, in some degree, exercised apart from society. We can conceive the human mind, in perfect solitude, thinking and reasoning, and exerting its ingenuity; and we can even suppose that, in such a state, it might have some faint notions of right and wrong. But it is certain that these faculties bear reference to other beings, and that man is destined for social intercourse. It is only, indeed, among our fellows, that the mental faculties can acquire any great stability or expansion. We have already seen something of the means which the Creator has employed, to unite mankind together in communities, and to call forth their powers in their social intercourse; and the system by which they are thus trained, is at once simple and profound. But it partakes of the imperfection of all sublunary things. If we would seek for its consummation, we must penetrate beyond the present scene,

* Edinburgh Encyclopedia.

and, by help of light from heaven, look into the eternal world.

In the Sunday paper immediately preceding, I have noticed this subject, in reference to the effects produced on the mind itself; but it yet remains, to regard it in connexion with the relation in which we stand to others. We are united together as brethren, the creatures of one God, the descendants of one parent, endowed with common faculties, subjected to similar influences and vicissitudes, alike subject to decay and death, and alike destined to live again in an eternal world. In regard to that eternal world, the sentence is equally pronounced on all, "He that soweth to the flesh, shall of the flesh reap corruption; he that soweth to the Spirit, shall of the Spirit reap life everlasting." We are thus united together by our origin, by our sympathies, and by our destiny; nor are we less united by our interests. Alone, man is helpless and unhappy. When he joins with his fellows in mutual labors, he becomes intelligent and inventive; capable of exerting much power, full of hope, and buoyant with energy and enjoyment.

But there is a canker here, as in other sublunary things. Man is but imperfectly social. He prefers his own interest to that of others; to that even of his nearest and dearest friend. He does not fulfil that Divine law, "Thou shalt love thy neighbor as thyself;" and, therefore, he does not follow the golden rule founded on it, which requires him "to do to others as he would that they should do to him." On the contrary, he undermines, overreaches, defrauds,—and is miserable.

It is not so in heaven. Charity survives all earthly gifts, all earthly graces. "Whether there be prophecies, they shall fail; whether there be tongues, they shall cease; whether there be knowledge, it shall vanish away;" faith shall end in sight, and hope in enjoyment; but charity is the very breath of heaven; it never faileth. When other attainments have fulfilled their purpose, and are shuffled off with our mortal coil, charity expands, till it envelopes the whole soul; it forms the cement which unites heart to

heart—the bond of perfectness which encircles and draws together the whole family of heaven.

The spirits of the just made perfect mingle with angels, and are their companions and friends. They are actively engaged with them in the same exalted pursuits. The earth-born sympathize with the natives of heaven; they love what these celestial spirits love; in their joy they rejoice; in the same temple they worship. The same wise, and holy, and gracious Being is their Father and their God.

To those who were once mortal like themselves, they are bound by a still dearer tie. They, like them, have passed from death unto life. They were under the same condemnation; they are saved by the same means; they are all equally the redeemed of Christ. To Him they mutually look as their common benefactor, with unspeakable gratitude and affection. In Him they find a bond of the tenderest and most endearing union.

There is a peculiarity and a depth, in the sentiment thus inspired, which angels cannot feel; and which, if it is not more intense than their feelings, seems at least better adapted to the nature of the human soul. The devout affections of angels are not, like those of the redeemed, enhanced by the remembrance of sins forgiven, of torments escaped, and of tears wiped away. They have no Saviour like them, who evinced his matchless love in torture and death; and in whom all the affections of the soul, elevated and rendered intense by this most endearing relation, may centre and repose. The children of mortality, become immortal, have, therefore, a peculiar bond of union and of sympathy. They sing together the song of Moses and the Lamb. Their love and their rapture are complete, when they think of the wonders of redeeming grace; and, adding their voices to the praises of those who, with themselves, have escaped the shipwreck of eternal destruction, swell the glorious anthem, peculiar to the race of Adam,—'Worthy is the Lamb who was slain, for He was slain for us, and hath redeemed us by his blood, out of every kindred, and tongue, and people, and nation. Unto Him that loved us, and washed us from our sins in his own blood, and made us kings and

priests unto God and his Father; to Him be glory and dominion for ever.'

But there is a higher and more ennobling employment still, which crowns the enjoyments of the celestial paradise. I allude to the exercise of the devout affections. Even in this world, imperfect and faint as are our conceptions of God, we can view Him with delight. We can, with feelings of admiration and reverence, see his perfections reflected from his works, and trace his hand in the operations of his providence and grace. Our hearts warm and overflow with gratitude, when we know that we ourselves are the objects of his paternal care; and when we further learn, that He has "not spared his own Son, but delivered Him up for us all," we are transported with astonishment, affection, and joy. What, then, must be our sensations when admitted to that heavenly temple, where, with open face, we shall behold the glory of the Eternal; and, being changed into his image, shall see Him as He is! How exalted, beyond all mortal conception, must be the pious feelings of the soul, when we shall be permitted to stand before the throne, and unite with angels, and with our fellow-redeemed, in worshipping the Father-God! "Eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love Him."

And this world is a state of preparation for these unspeakable blessings! "What manner of persons, then, ought we to be in all holy conversation and godliness?" Compared with the glory which shall hereafter be revealed, "how weary, stale, and unprofitable are all the uses of this world!" How poor is worldly ambition; how unsatisfactory and perishable worldly pleasure; how contemptible all sublunary pursuits! Here, we have nothing we can call our own: and, if we had, how short would be our possession! There, we are invited to inherit all things. Are we desirous of improving our rational powers, and eager in the pursuit of useful knowledge? It is well; but let us seek for these attainments on the road to heaven. In no other way can our intellectual faculties be so well employed; by no other means

can our thirst for knowledge find an object capable of satisfying it. But, more important still, is the cultivation of our moral and religious feelings,—those affections and habits which bind us to each other, and to our common Father and Redeemer. These, above all, prepare us for the joys of heaven. The pure, and holy, and pious alone shall see God. Those who have cultivated Christian charity on earth, are alone fitted to be denizens of that happy land whose Eternal King is love, and the duties and enjoyments of which consist in loving and being beloved.

NINTH WEEK—MONDAY.

CLOTHING.—THE ART OF DYEING—ITS MODERN HISTORY.

WHATEVER knowledge of dyeing the ancients possessed, appears to have been nearly lost about the fifth century, a period when almost all the arts were in a state of decay, and but few traces of civilization remained in the Western Empire. A faint knowledge of the arts was, indeed, retained in Italy, and afterwards kept alive by occasional intercourse with the East, in consequence of the Crusades, as well as by the introduction of various articles of luxury and refinement, by the commercial enterprise of the Venetians. This importation continually afforded new materials for industry, and new objects for imitation, and gradually led to the revival of the arts in Italy. The knowledge of the arts of dyeing, practised by the Greeks and Romans, was, in some measure, restored by the acquisition of chemical sciences, which early began to shed a feeble light, in modern Europe, over the objects of human industry.

From Italy, the knowledge of dyeing gradually spread itself through the other states of Europe. In the fifteenth and sixteenth centuries, some works were published, detailing the processes then in use, which seem not only to prove, that greater attention had then begun

to be paid to the art, but to have afforded the first great stimulus to its improvement. Indigo had long been known as a dye; it is mentioned by Pliny, under the name of *indicum*,* and seems to have been early imported from Syria and Egypt in considerable quantities. This drug came, however, to be much better known after the Dutch had established their trade with the East Indies, from whence they imported it.

I have already had occasion to remark, that accident has frequently contributed more to the improvement of the arts, than the most refined speculation; and this was strikingly exemplified in the discovery of the modern scarlet dye, as well as in that of the ancient purple. The kermes were early used for dyeing, and the term *scarlet* was applied to the color produced by these insects; but that color was very different from the brilliant scarlet now in use, which is derived from cochineal, an article which was unknown in Europe till the discovery of America; and which, even after its importation, produced for a considerable time not a scarlet, but a crimson hue.† About the year 1630, it was accidentally discovered, that the nitrate of tin possessed the property of exalting, in a very remarkable degree, the color of this drug, and converting it from a dull crimson to an intense and brilliant scarlet. It is said, that a German chemist, of the name of Kuffler, having accidentally dropped a solution of tin, by aquafortis, into a decoction of cochineal, was the first who observed the singular effect, and who took advantage of it, by employing it in his dye-house. The secret became soon afterwards known in Paris; and, having been, in the year 1643, conveyed to

* [*Indicum* simply means Indian, or from India, and being applied to the foreign drug to denote whence it came, was at length used as the name of the article itself, forming by a slight change the word *indigo*. The proper Indian name for the article is *Anil*. It is procured from several, but especially from two or three plants, belonging to the order of vetches.—Am. Ed.]

† [Both of the dyeing substances mentioned above, are parasitic insects, of the genus *Coccus*, the one inhabiting a species of oak, in warm climates of the Old world, and the other dwelling on certain species of cactus, in the tropical regions of the New. This genus of insects, in some of its species, goes by the common name of the scale insect.—Am. Ed.]

England by a Fleming, gave rise to a dye-house at Bow, near London ; whence the new color was for some time called the *Bow dye*.

In 1662, the Royal Society of London directed its attention to the subject of dyeing; but the chemical art was then too little understood, to permit of much success in their labors ; and the art made little progress in England, till a much more recent period. In France, the case was different. The legislature of that country not only appointed proper persons to superintend, officially, the practice of dyeing in all its departments ; but held out suitable rewards for the encouragement of such individuals as should contribute, by their discoveries, to the progress of the art. The beneficial effects of this liberal policy, were quickly felt in the numerous improvements in dyeing, which were suggested, from time to time, by the eminent men who filled the official situations. The investigations of Hellot, of Macquer, and of Berthollet, who, each in his turn, held the office of superintendent of the practice of dyeing in that country, gave a new character to the art, and raised it from an obscure, empirical employment, to the rank of a branch of chemical science. The latter, in particular, distinguished himself by conjoining extensive observation with enlightened theory ; and published a treatise, which may be considered as a standard work on the subject, since it contains not only a detailed account of the practical operations of the art, but a correct theoretical view of the principles on which it is founded.

The two eminent Englishmen who have conferred the most important benefits on the practice of dyeing, are Dr. Henry of Manchester, and Dr. Bancroft. The latter, in particular, has thrown new light on this art, by his two volumes, entitled, 'Experimental Researches concerning the Philosophy of Permanent Colors,' the second of which was published in 1813. In this work, he has corrected various mistakes of his predecessors, and has advanced the scientific and practical principles of the art still nearer perfection, by applying to it more extensively the growing resources of chemistry.

NINTH WEEK—TUESDAY.

CLOTHING.—THE ART OF DYEING—ITS CHEMICAL PRINCIPLES.

Before leaving the subject of dyeing, it seems desirable that something should be said respecting the principle on which the art depends, so far as it has hitherto been discovered by chemical analysis.

Dyeing is effected by the principle of chemical affinity. There must be such an affinity between the stuff to be dyed and the coloring matter, otherwise the process will not be effectual. Now, this may be either direct or indirect; or, as Dr. Bancroft expresses it, the coloring matters may be either *substantive* or *adjective*; "the first including those matters which, when put into a state of solution, may be fixed with all the permanency of which they are susceptible, and made fully to exhibit their colors in or upon the dyed substance, without the interposition of any earthy or metallic basis; and the second, comprehending all those matters, which are incapable of being so fixed, and made to display their proper colors, without the mediation of some such basis." Both of these kinds of dyes are to be found in various productions of the animal, vegetable, and mineral kingdoms; but the adjective are much the most numerous. These having no affinity, or but a very slight affinity to the cloth itself, are yet powerfully and permanently attracted to another substance, which, in its turn, is attracted to the cloth. This intermediate agent is called a mordant, and the effect was long known, before the chemical principle on which it depends was at all suspected. It was not till the last half-century, that the true theory was understood. Before that period, the most absurd and unphilosophical opinions were entertained concerning it. Dr. Bancroft suggested the right principle in regard to ink and the black dye, which he attributed to the chemical affinity between iron and the coloring principle of galls; but Mr. Keir was probably the first, who proposed

a true explanation of the cause of the adhesion of the coloring matter to stuffs. Berthollet, however, ascribes the theory of mordants to Bergman. This eminent chemist observed, that, when wool or silk was immersed in a solution of indigo in sulphuric acid, the former attracted the coloring particles more forcibly than the latter; and that both, having a stronger affinity for the indigo than the solvent, were by this means able to deprive the bath of its color, and attach it to their own fibres. Upon the same principle, he explained why the colors communicated to the wool were more durable, as well as more intense, than those communicated by the same process to silk.

On this principle, depends "the truly wonderful" art of calico-printing, which consists in communicating different colors to particular spots or figures on the surface of cotton or linen cloth, by placing it in a bath of compound dye, the rest of the texture retaining its original whiteness. This art was known in India, as already mentioned, at a very early period. To the uninitiated among the ancients, it must have appeared like magic; and, although the science of chemistry has laid open to the moderns so many mysteries and secrets of Nature, yet, even now, it is a matter of curiosity and admiration to behold a colorless texture, after being immersed for a short time, drawn forth, exhibiting figures of vivid and various hues, durably marked on its surface. This art is of comparatively recent date in England; but no branch of industry has risen to perfection with greater celerity. At present, the elegance of the patterns, the beauty and permanency of the colors, and the expedition with which the different operations are carried on, are highly admirable.

If we inquire into the cause of colors, we shall find that this depends not so much upon the chemical constitution of a body, as on a certain arrangement or disposition of the particles of the surface. Many bodies display different colors, according to the particular angle under which they are viewed, while others assume a change of color, simply by the change of their mechanical condition.

Hence it appears, that color ought not to be regarded as a distinct principle, existing separately from the colored body, but merely as a faculty which the constituent elements of bodies possess, of reflecting particular rays of light decomposed at their surface.* This faculty may be variously modified; and we cannot tell what may be the color of a compound body, from the nature of the principles which compose it, when not previously ascertained by experiment. Frequently, two colorless bodies form a colored compound by mixture; and it often happens, that two substances, each of which has a very deep color, are rendered entirely colorless when united; while, in other instances, an entirely different color is produced than what might have been expected.

"Of all the arts," says Berthollet, "that of dyeing, perhaps, with respect to its theory, requires the most extensive knowledge of natural philosophy; because it is that which presents the greatest number of phenomena to analyze, of uncertain changes to ascertain, and of relations to establish with air, light, heat, and many other agents, of which our knowledge hitherto has been very imperfect." This is doubtless true; but what science has already effected, should operate as an encouragement to prosecute the study. It is surprising to see what new light sometimes breaks unexpectedly in, on the most abstruse and obscure investigations, and how much the ingenuity and diligent research of scientific men add to our real knowledge of Nature, even in those instances in which little is gained to the advancement of art.

There may be much in the produce of the dyer's skill, as indeed there is in every art, to foster the vanity of a frivolous mind; but there is much also to elucidate the operations and the designs of that unseen Creator, who has so wonderfully filled every department of his works with incentives to human exertion; and who, in these works, every where affords food to the well-ordered

* See 'Spring,' Paper on the 'Color and Figure of Bodies.'

mind, for the nourishment of a manly and enlightened piety.

NINTH WEEK—WEDNESDAY.

ARCHITECTURE.—ITS PRINCIPLE.

ANOTHER mode by which the human faculties are stimulated, under the remarkable system of Providence, is by the necessity to which man is subjected, of providing for himself the means of shelter. This is the first object of building; and the most simple want of this class, is that of a provision against the changes of the atmosphere, and the fury of savage beasts. The human mind, however, is seldom stationary; and, unless when coerced by the pressure of tyrannical power, or chilled by penury, or charmed to repose in the lap of plenty, is active and ingenious in providing itself with new comforts, and in extending at once its resources and its enjoyments. Nature herself affords the stimulus by which its faculties are kindled into action; and the spark, which the stroke of her hand elicits, is fed into an increasing flame, by the varied materials with which she abounds.

It is not long before society, under favorable circumstances, increases in its wants, and finds the means of gratifying them. Architecture, which ranks among the earliest of the arts, did not fall behind the rest in the race of improvement. What necessity engendered, was fostered by the restless propensity to change, the desire of possessing, and the ambition to excel. An increasing family, too, required extended accommodation, while numbers gave power, and combined ingenuity, invention. Thus, on the supposition, assumed for the sake of elucidation, that man was at first a savage, left to his own resources, he would gradually emerge from that state, and, as he rose, would naturally make progress in the architectural art.

At first, a natural hollow in the bosom of projecting

rocks might suffice for refuge from the inclemency of the weather; but even there, a barricade would be necessary to guard against external violence; and other inconveniences of such an abode, would quickly suggest the expediency of calling in the assistance of art. As the family enlarged, new chambers would be hollowed out, either communicating with the original cave, or placed at some distance from it, as circumstances rendered most convenient; while the materials removed in these operations, might suggest the idea of rearing habitations of stone on the adjoining plain. In other localities, the neighborhood of a forest, where summer shelter and protection were found under some leafy shade, within an enclosure of stakes, would suggest the idea of a wooden hut covered with leaves, the comparative warmth and comfort of which would recommend it for constant use, during the genial as well as the rigorous season of the year; and in the fertile and open plains, where neither of the resources already mentioned could be obtained, a pit dug in the earth, and elevated into walls above its surface, by the excavated materials, while reeds and grass furnished the roof, might give rise to the mud cabin so common in various parts of the globe.

As architecture advanced, notions of convenience would be improved, and ideas of beauty and proportion would be introduced, which would form the first germs of the principles of taste connected with the art. This leads to a complicated and somewhat recondite question, into which I shall but slightly enter. Ideas of architectural taste seem to depend chiefly on two circumstances, utility as regards the object in view, and habit, arising from the original use of materials.

Mr. Alison, in his 'Essay on the Principles of Taste,' has discussed this subject with great acuteness. He has endeavored to show, that the beauty of proportion in architecture is resolvable into acquired ideas of fitness, and does not arise from any original law of our nature, or from any power of pleasing in the forms or objects themselves. The beauty of external proportions, he tells us, arises from their apparent suitableness for hu-

man habitations, when viewed from without, and consists in stability and sufficiency for the support of the roof. Thus, when the walls are of a proper thickness, and are placed at a sufficient distance from each other, to suggest the idea at once of stability and convenience, the building is considered as well proportioned ; but when, on the contrary, the walls are so thin and high, or so distant from each other as to impress us with the idea of insecurity ; or, on the other hand, so thick, so low, or so close together, as to appear to have been reared at unnecessary expense, or to have been inconveniently contrived, that building is reckoned to be ill-proportioned. Proportion, therefore, in those cases is merely fitness. We are here guided entirely by experience ; and our sentiments respecting proportions are influenced by the nature of the buildings, and the materials of which they are composed. Edifices constructed of wood or brick, do not admit of being raised to the same height as those of stone ; while a house, united with others, as in a street, may, without offending the taste, be carried higher than if placed alone ; and a tower or spire, having only itself to support, may be elevated to a much greater height than any other species of building. These principles are all that seem to regulate the external proportions of simple buildings, and each of them obviously depends on fitness.

But besides this general principle, there are various associations which greatly modify the taste, while they exalt the enjoyment. Antiquity alone stamps a value on a particular form, while the costliness of the work adds an idea of magnificence to the sentiment. A still more powerful feeling is excited from national partialities. The style of each particular country or tribe, affects the taste in a degree not easy to be appreciated. When men have, from infancy, viewed a particular form, in connexion with the splendor of wealth and power, or the solemnity of devotion, it makes an indelible impression on the mind, in which the associations with these adventitious circumstances are intimately but unconsciously blended. Hence, the effect produced on natives by the style of building peculiar to their country ; an effect

which is experienced, if at all, in a very inferior degree by a foreigner. The temples of Egypt, of Greece, and of Rome, besides their intrinsic grandeur, carried with them, doubtless, the veneration of the people, on account of the sacred solemnities with which they were associated. A similar observation may be made in relation to the palaces of princes. It is not merely the magnificence of the building, but the awe attached to rank and dominion, which strikes the mind in such instances, and affects the taste.

There is certainly, however, a peculiar style of architecture appropriated to particular kinds of building, which indicates a power in the art to express a distinct character, and to call forth specific feelings, independent of adventitious or accidental association. Thus, there is something venerable in the massive proportions, and immense and elevated arches of a mighty Gothic temple, which inspires awe in every mind, at once approving itself to the taste as appropriate to the object to which it is devoted; while the lighter and more airy structure of the palace, while it still exhibits grandeur and magnificence, is divested of that mysterious sublimity, which well befits the worship of the unseen Deity, but would be felt as out of place in the residence of the most powerful of mortals.

On whatever principle of our nature these sentiments depend, whether they be original or acquired, there can be no doubt that they equally indicate design in the All-wise Framer of the human soul. It is not from theory, but experience, that the perception of beauty, sublimity, or grandeur in the productions of the architectural art is derived.

NINTH WEEK—THURSDAY.

ARCHITECTURE.—ITS ORIGINAL STATE—MATERIALS EMPLOYED.

THE art of building is connected with the seasons of the year in a different manner from food and clothing,

which we have already considered. Both of the latter, deriving their materials from organized existences, either vegetable or animal, depend directly on the produce of the soil and the seasons. The former, on the contrary, obtains large supplies from the mineral kingdom, and derives little aid from the other departments of Nature, with the exception of trees, the most gigantic of vegetable productions, which require many successive revolutions of the seasons to mature.

In one respect, however, architecture is intimately connected with the changes of the year, as it is owing to these changes, that shelter for human beings is rendered peculiarly necessary. Were the seasons of one uniform temperature, and the climate always mild, and free from the annoyances either of intense heat or of violent tempests and rains, the necessity of artificial habitations would have been but little felt, except as the means of defence against enemies, or against the ravenous beasts of the forest. But the alternations of heat, moisture, and cold, which the progress of the year exhibits, in almost every region of the earth, have rendered shelter in a prepared dwelling one of the first necessaries of life.

That this art existed before the flood, we have express testimony from Scripture; and that it had made considerable progress in that primitive era of the world, is rendered probable by the early attempt of the descendants of Noah, to erect a building of tremendous dimensions on the plain of Shinar, where they first took up their residence. The confusion of their language, and their consequent dispersion, caused some of their tribes to lose the arts which had survived the flood, and all of them to conform their habits and modes of living to the circumstances of the locality in which they happened to be placed. Hence originated various styles of architecture, adapted to the peculiar exigences of the climate, to the inconveniences to be avoided, to the comforts within their reach, and to the materials with which they had to operate.

We have, even in the present day, specimens of the lowest and rudest species of architecture which human beings, in any period of their history, ever formed. The

New Zealander digs his wretched habitation in the sand; the native of Australia raises a temporary habitation for himself of wicker-work, in the form of a bee-hive, and of dimensions just sufficient to shield him from the blast; the Carib, wandering among the trackless forests of the Western World, scoops, within the hollow of a decaying tree, a dwelling, whose foundations are deep-rooted in the earth, and whose top waves high in the air; the Tartar, on the central plains of Asia, suits his place of shelter to his wandering life, and, as he drives his herds from pasture to pasture, constructs his portable habitation of the hides of those very animals which he uses for his food; while, on the road, he spreads them as an awning over the wagon which conveys his family.

The simple wants of the savage state, however, do not suffice man as he advances in civilization. Even the wandering Tartar, when his wealth and power increase, extends his views, and converts his simple tent into a habitation abounding with conveniences, and splendid with embellishments; and if, leaving his deserts, he emerge into regions of greater fertility, he is glad to adhere to the soil, and, employing more substantial materials, to collect around him the comforts and luxuries of a permanent mansion. It is a Tartar race which inhabit the extensive plains and mountains of China, and there raise for themselves houses of wood, of stone, of clay, or of brick.

Other Asiatic tribes inhabit the burning plains and extensive mountain ranges of India. There the first emigrants seem to have found shelter for themselves, by digging into the bowels of the earth, and excavating cool habitations in the barren rocks which skirted their prolific soil. Thus arose the stupendous excavations of the Bahar; and thus were formed, along the banks of the Ganges and the Burrampooter, those cities of caves, of which some served as retreats for the living, while others were left as receptacles for the dead. Extending into the fertile plains, where this resource no longer availed them, the same people accommodated themselves to circumstances, sometimes building substantial piles of those

very stones, perhaps, which had been quarried in excavating their habitations in the solid rock; and sometimes making use of the mud, reeds, and rushes, found in the bed, or on the banks of their rivers.

Similar circumstances, gave rise to similar modes of constructing habitations in the north of Africa, as in the south of Asia. Travellers have thus been surprised to find a wonderful coincidence, in the early dwellings of the inhabitants of Egypt and of India; and, as along the banks of the great rivers of the latter, so along the course of the Nile in the former, were dug those subterranean cities, which, having served as places of residence for the living, were converted into sepulchres for the dead; while in their plains, the slime and rushes which their waters abundantly yielded, furnished them here, as in the distant regions of Hindostan, with materials, slight and perishable indeed, but of easy application for their ordinary structures. In both localities, too, the inhabitants, as they advanced in civilization, sought for more permanent edifices for their gods, and for the palaces and tombs of their great men, by making use of the durable rock, which was brought from a distance, and wrought and raised at great expense. These, and other similarities, have led many to conclude, that those distant tribes betrayed a common origin, when it is possible that corresponding circumstances, merely led men possessing a common nature, to exercise their ingenuity in a similar way.

The use of bricks in masonry was very early introduced. As soon as men began to construct high buildings, at a distance from mountains and forests, they would find themselves at a loss for materials. It is probable that stone was not first used for this purpose, as tools would be wanting. The cutting and hewing of stone would require the knowledge of more arts than men were acquainted with in those early ages. They began with using bricks; that is, clay, formed in square moulds, and dried in the sun, or baked in stoves. Of such materials, the tower of Babel was built. The Egyptians also made very early use of this substitute for reeds and crude clay.

In the first efforts of European architecture, we find several traces of local peculiarities. There, immense forests, while they encumbered the soil, offered their aid in furnishing the means of shelter. As soon as the aboriginal inhabitants desired a more secure and convenient habitation than was to be found beneath the shelter of the overhanging rock of the mountain, or the thick foliage of the wood, they found it in the gigantic vegetation with which they were surrounded; and the wooden hut arose to form ever after the model for their most refined architecture.*

NINTH WEEK—FRIDAY.

ARCHITECTURE.—ITS ORIGINAL STATE—TOOLS EMPLOYED.

Architecture could make but little progress, till mankind had discovered certain arts, which are absolutely necessary to its advancement; such as the making of machines for the raising and transporting of weighty bodies, the art of taming animals, and training them to carry materials; and, last of all, the art of working iron, that most useful of all the metals. It is true, however, that wonderful efforts have been made, without the knowledge of these arts. The people of Mexico and Peru, when first visited by the Spaniards, had neither carts, sledges, nor beasts of burden, but transported their materials by mere strength of arm. They knew nothing of scaffolds, cranes, or other machines, employed in other divisions of the globe in the construction of buildings. They were even ignorant of the use of iron. Notwithstanding all this, they had the address to raise buildings of stone, which are beheld with admiration even at the present day. Patient labor supplied the place of tools. Their way of dressing stones, was to break them with certain flints, very hard and black, and then polish them by rubbing one

* Hope on Architecture. Introduction, and chaps. ii. and iii.

against another. It is possible, that the first masons, in the primitive ages, might make use of the same methods. There are still nations who build magnificent edifices, with few tools and machines; and who have no other way of polishing their stones, than that originally employed by the natives of the New World.

But these modes of operation are so tedious and fatiguing, that, as long as mankind were unacquainted with more advantageous methods, buildings of stone must necessarily have been very rare. Such edifices could not be common till tools for hewing, and machines for transporting materials, had been invented.

The art of hewing stones, and building houses of them, must, however, have been known in very remote ages. The Egyptians gave the honor of this invention to Tosorthus, the successor of Menes. They even attributed the building of a pyramid to Venephes, one of their earliest kings. In Egypt, indeed, this art would naturally be resorted to, at a very early stage in the progress of improvement. The nature of the locality required it. Egypt wants wood for building;—they were, therefore, compelled, as it were, to exercise their ingenuity in inventing modes of constructing their public edifices of stone and marble. Accordingly, we find that they had very early discovered methods of transporting their heavy materials with ease. Almost from the commencement of their monarchy, they had drawn canals from the Nile, which communicated with each other, and stretched to the foot of their rocky mountains. Wheel-carriages, also, were used in that country in very early times. We hear of wagons, as not uncommon in the days of Joseph.* Our information of the real state of the instruments employed in those early times, is exceedingly defective; and we can only conjecture the nature of their tools and machines, by the effects which were actually produced by them, in the immense piles of building which were raised.

The discovery of the art of working iron, however, we know, preceded the Deluge; and this art was doubtless

* Genesis xlv. 19.

preserved by the survivors of that great catastrophe. It is impossible, indeed, to account for the rapid advancement in the art of building, as well as in other arts, but on the supposition that the knowledge of the antediluvians was transmitted, as might be expected, by Noah and his sons to their posterity. They carried with them, to a rescued world, the inventions which had been accumulating through a series of ages; and thus the second fathers of mankind placed their descendants in a favorable position for improving the means which Nature put within their reach.

The geological structure of the earth, as I have elsewhere observed, favored the discovery of metals, on which the improvement of the architectural art so much depends. When the earth was heaved up into mountains, the metals which lay deep in its bowels were frequently brought near its surface, and might be discovered, on the ploughing up of the soil by floods and mountain torrents, either lying in the channel of the stream, or mixed with sand and gravel left on its banks. With regard to mines, various accidents, besides the impetuosity of torrents, might discover to mankind the mineral substances which the earth concealed in her bosom. Examples of such accidents sometimes occur at the present day. A gold-mine was discovered in Peru, about a century and a half ago, by the cleaving of a mountain in a thunderstorm. The famous mines of Potosi were first brought to light by another kind of accident. An Indian, climbing up some rocks, covered with trees and bushes, in his efforts to ascend, took hold of a small tree, which came up by the roots, and by this means betrayed an ingot of silver.

But, if it be easy to imagine how the first men might discover metals, it is difficult to conceive how they arrived at the art of working them. It is only by means of fire, that we can prepare metals for our use. Even before they can be forged, they must be melted and refined, and cast into pure masses, to be afterwards divided at pleasure. These operations are difficult, and require no little dexterity, knowledge, and reflection.

As fusion is the first means used for these purposes, we may suppose, that volcanoes might originally suggest the idea of metallurgy. What renders this conjecture more credible is, that those persons to whom antiquity has assigned the invention of this art, lived in countries famous for the action of volcanic fires. Ancient writers, however, have given a different account of this discovery. They are pretty generally agreed in ascribing it to the burning of forests, where the soil contained metallic ores. The violence of the fire, according to them, having melted the metals, they flowed out, and diffused themselves on the surface of ground. It was in this manner, as the old traditions of Greece assert, that iron was discovered on Mount Ida ; and it is to a similar accident that historians attribute the discovery of the silver-mines on the Pyrenees.

By whatever means the art of fusing metals was discovered, there is every reason to believe, both from the nature of the different substances, and from the evidence of history, that iron,—the most important of them all,—was the last to be discovered and applied to use. It is not found, like silver and gold, in a pure state, nor is it easily distinguished in the ore. But, independent of this, it is the most difficult of all the metals to bring into fusion, and to render ductile. A piece of this metal once melted, is as untractable as ever, and not more malleable than flint. In order to be rendered fit for the forge, therefore, considerable art must be previously employed. It must be melted a second time, and beat with heavy hammers ; it must then be heated again, till it is on the point of fusion, and once more put under the hammer. This operation must be repeated again and again, till at length this hard and brittle mass becomes the tractable and malleable substance, so useful in the arts.

It will not be matter of surprise, then, that the use of silver, and especially of copper, preceded, in many countries, the use of iron. This is the testimony of all antiquity ; and we are also informed, that they had acquired the art of tempering copper with tin, so as to give it most of the properties of iron. We know, however, that tools

of iron were employed in very early times. The writings of Moses are sufficient to establish this fact. It is evident, from the manner in which this most early and authentic of authors speaks of iron, that it had been in use long before his time. The country of Canaan is described as "a land whose stones are iron,"* and he compares the severity of the servitude of the Israelites in Egypt, to the heat of a furnace for melting this metal. But what is most worthy of attention is, that we find mention made of swords, knives, axes, and, what is more to our present purpose, of tools for cutting stones, all formed of iron. They must, therefore, have known the art of tempering this metal, and even of converting it into steel.†

These notices, as they show some of the difficulties that the art of architecture had early to contend with, will serve to exalt our conceptions of the ingenuity exerted by ancient nations, in erecting those stupendous fabrics, which still remain, to humble the pride of modern artists, confound their imaginations, and stimulate their enterprise.

NINTH WEEK—SATURDAY.

ARCHITECTURE.—ITS MODIFICATIONS BY THE INFLUENCE OF HABIT AND RELIGION.

BEFORE entering on the interesting subject of the architectural remains of antiquity, a few observations seem to be called for, in reference to the circumstances which gave rise to the different styles of building prevalent in

* Deut. viii. 9.

† See Deut. iv. 20; Numb. xxxv. 16; Levit. i. 17; Deut. xix. 5, and xxvii. 5. The manner in which tools of iron are mentioned in the last-noted passage, shows that it was the only metal then in use for cutting stones. "And there thou shalt build an altar unto the Lord thy God,—an altar of stones: Thou shalt not lift up any iron tool upon them." Compare this with Exodus xx. 25, and Joshua viii. 31.

different countries; and I find some valuable hints on this subject in the posthumous volume of Mr. Hope, of which I avail myself.

In the preceding paper, I have run over in a cursory manner, the state of the earliest tribes as to their means of shelter, and the uses which they made of these means; and I have now to observe, that the habits which they early formed in the art of building, did not entirely change with their materials, but in many instances produced an influence on their taste, even when their circumstances were greatly altered. In every country where new materials were employed, the shapes and modifications which had naturally arisen from their original use of other natural productions, were in a certain degree preserved, or rather imitated; and policy and religion seem even to have given to this method the sanction which might be thought to be denied to it by reason. It reminded the tribe of its earliest infancy, and its primitive arts. It was connected with the worship of the God from whom these were always supposed to be derived, and with all their most interesting and powerful associations.

From this universal propensity to retrace, in the latter methods of construction, the forms of the earlier materials, we see the architecture of the Chinese still resembling, in all its parts, the original type of the tents of their Tartar ancestors. In the wooden pillars, destitute of bases and capitals, which in such numbers support the ceilings, we trace the poles; in the roofs, which, from these pillars, project so far, convex alike in their spine, their sides, and their ribs, we observe the awning of hides or pliant stuffs, spread over ropes and bamboos; in the curling spikes which fringe their eaves, the hooks and fastenings; in the lowness, and spread, and clustering of the different parts, the whole form, appearance, and character belonging to the residence of the original herdsmen. Chinese houses seem to cling to posts, which, when planted in the ground, have struck root, and become fixed; the palaces look like a number of collected awnings; and the very pagodas and towers in their loftiness, would appear to be nothing more than a number of

tents piled on the top, instead of standing by the side of each other.

Even that other swarm from the Tartar hive, which, at a later period, under the name of Turks, overwhelmed the Greek empire, distant as are its dominions, enables us to trace, in the stationary dwellings of the inhabitants, the form of the portable tent of its nomadic ancestors. While the mosques and public buildings of this people partake of the fashion of the once flourishing empire which they subdued, their private habitations, from the roof of the meanest cottage, to the porch of the grandest kiosk or the palace, in its low-spreading expanse, its widely extended eaves, broken at various angles, supported by numerous pillars, and almost reaching to the ground, still strikingly recall the same model, and differ little in shape and distribution from the real Tartar tent.

The architecture of the native Hindoos is of a character altogether different, and its type may be traced in the gigantic caves of Ellora, and the temples of Elephanta and Benares. It represents, in a form less ponderous, the cavern dug in the solid rock, or the pyramidal dwelling composed of the rude materials which had been extracted from the bosom of that rock, in forming the huge excavations.

In the buildings of the ancient Egyptians, derived from a similar origin, the fancy may please itself by tracing the preservation of this same form. The temples, the mausoleums, all the subsisting remains of that people every where, are considered by Mr. Hope, as deriving their original type from the cavern cut in the side of the rock, and the dissevered fragments again raised in the neighborhood. "Not merely the catacombs," says our author, "but the edifices springing aloft from the ground, in the spread of their space, in the slope of their sides, in the overhanging of their brow, in the mass of their solid parts, in the smallness and lowness of their apertures, in the thickness and shortness of the pillars that support these, resemble the ridge of rock partially pierced, or the insulated mountain rising from its wide base, and tapering to a narrow apex."

In the Greek edifice of stone and marble, it is more obvious, that the form of the primitive cabin in which it originated, constructed of the stems, branches, and foliage of trees, was religiously preserved. Every later improvement for use, every more elaborate addition for ornament, which was displayed in these, only appeared as a supplement to the fundamental form, and was in no way allowed to alter or conceal it. Indeed, in proportion as the building was of a more public nature, the wooden hut might be even said to be more carefully imitated. No where was it seen more distinctly marked, than in that magnificent temple at Athens, dedicated to Minerva, the patron deity of the city. As the rude Greek cabin of wood was more varied and definite in its component parts, than either the tent or the excavation, the similitude was much more striking in all its details, and throughout all its alterations and embellishments.

So powerful is the principle which has been stated as influencing the peculiar style of architecture belonging to any particular race of men, that should some original and fundamentally different mode of building be any where discovered, we may be sure its singularities have, at some period, taken their rise from a temperature, a material, or a system of customs and manners, radically at variance with those of the communities we have mentioned.*

There is one mighty element in the perpetuation of a distinct style of architecture among extensive races, which requires special notice. I allude to religious views and prepossessions. The priesthood, in early ages, form a powerful and united fraternity, who excel the other members of their tribe in learning, and exercise a despotic power over their ignorant and superstitious minds. Prejudice and policy combine, in such a body, to repress innovation, and to perpetuate the customs, habits, and practices, of the remote antiquity from which they date their origin, and with which their fabulous mythology is intimately associated. Such a class of men was found in the Egyptian priesthood, in the Indian Brahmins, and in

* Hope on Architecture, chap. iv.

the religious order of Greece. From these societies emanated the laws which regulated the public taste ; and under their direction the mighty fabrics were reared, which have preserved, even to our own day, a practical knowledge of the architecture of their age. Had it been otherwise, it would have been scarcely possible to account for the uniformity which prevails in the character and style of their public buildings. Tyrants are capricious, and a free people are inventive. It belongs to a corporation of priests alone, to wield a power such as that displayed in the art we are considering, with a rigid and undeviating uniformity of design.

TENTH WEEK—SUNDAY.*

THE CHILDREN OF THE WORLD WISER THAN THE CHILDREN OF LIGHT.

"THE children of this world," says our Divine Teacher, "are wiser in their generation than the children of light," and this truth is confirmed by all experience, and is obvious to the most cursory view. The astonishing labors and inventions of man in promoting his own plans of comfort or luxury, or in gratifying his love of acquiring, and his thirst for power, which we have been contemplating, give an additional force to the aphorism ; and while they exhibit, in a very striking light, the powers of the human mind when strongly called forth and intensely occupied, serve at the same time to mark more distinctly the difference which exists in the success with which men prosecute their temporal and their eternal interests.

If we inquire into the cause of this difference, it will not be difficult to discover that it lies in the comparative

* [The papers for this and the next Sunday, as they stood in the original, have been abridged and brought into one in this edition.—AM. ED.]

degrees of zeal and intelligence which are applied to each. In the one case men are in earnest, in the other they are careless and indifferent. This at once explains the mystery, and unfolds a very painful view of the perverseness of the human mind. It has been alleged, in excuse for man's disobedience to the law of God, that human nature, in its fallen state, is so constituted as to be unable to perform the moral and religious duties required of it. But, though there be truth in this assertion, it cannot be urged as an adequate excuse; because the very principle which prevents our obedience is a principle of obstinacy, rebellion, and ingratitude. Our impotence lies neither in our understanding nor in our bodily power, but simply in our inclinations. The duties of religion are around us and within our reach. "They are not hidden from us," as Moses expresses it, "neither are they far off. They are not in heaven, that we should say, who shall go up for us to heaven, and bring them to us, that we may hear them, and do them; neither are they beyond the sea, that we should say, who shall go over the sea for us, and bring them to us, that we may hear them, and do them; but they are very nigh to us, even in our mouth and in our heart, that we may do them." Yet the law of God, although it be thus obvious and practicable, is not performed by us. Why? Just because we are disinclined. There is no other disability. But it is inveterate.

To be convinced of the truth of this view, we have only to ask our conscience, what prevented our performance of religious duty, in any one instance that may occur to us. We shall be forced to acknowledge, that we failed merely because we were unwilling, or rather, because our propensities and desires urged us in an opposite direction. We were sensible, perhaps, all the while, that the action to which we were tempted was sinful,—contrary to the law of God, and contrary, also, to our own best interests; but inclination prevailed over judgement and principle, and thus we fell.

Let us take a particular example, and we shall be able more clearly to estimate the nature and extent of this disa-

bility. A familiar instance occurs to us in the keeping of the Sabbath. What does this command imply? Certainly nothing impossible. It implies, that we abstain from our usual worldly employments; that we reject worldly conversation; that we check and banish worldly thoughts. In this negative part of the duty, there is clearly nothing impossible; nor can it be said, that its positive duties are beyond our reach. It requires that we be actively employed in religious exercises in our closets, in the bosom of our family, and in the house of prayer; and, while thus occupied, that we raise our souls from the contemplation of things which are seen and temporal, to the contemplation of those that are unseen and eternal.

These are exalted and sublime employments, but they imply no impossibility. The great bulk of mankind, indeed, do not perform them, and the very best of men perform them but imperfectly; but it is not from want of mental or physical capacity. There is no other disability but want of inclination. From the moment we love such exercises, they become easy and agreeable. Men execute tasks as difficult every day, and delight in them, although the real value of these tasks be infinitely inferior. They are able to do this, because their hearts are set on them.

Of this, the progress society has made in the arts of civilized life, which we have lately been considering, is a striking proof. The laborious improvement of agriculture, the inventions connected with manufacturing industry, and those amazing piles, or beautiful or convenient structures, which have crowned architectural skill, all show what can be effected by human ingenuity and labor, when the mind is roused, and gives itself willingly to the work. Who can examine a well-cultivated farm, with all the implements of husbandry employed in its management; or consider the magical labors of the cotton-mill; or contemplate the gigantic ruins of Egypt, without being filled with astonishment at the capabilities of man's natural powers. Nor will our wonder be lessened when we turn to the achievements of science, and think of the reach of intellect which could define and demonstrate the laws of the

material universe, and, penetrating to the remote stars, could trace, at the distance of millions of millions of miles, the movements of an infinite Creator.

But it is not necessary to have recourse to these more extraordinary efforts of the human mind, in order to convince us of its capacity when roused by some engrossing object. We see the same thing in the very humblest vale of life. Look at the fond mother, who presses her smiling infant to her breast, and watches over it night and day, and denies herself her necessary rest, and seeks no other occupation, no other enjoyment. Look at the affectionate father, who toils, and bustles, and racks his ingenuity, and "rises early, and sits up late, and eats the bread of carefulness," to provide for the wants and comforts of his beloved offspring,—whether as a merchant he compasses sea and land, and buys and sells, seeking for gain; or as a husbandman he cultivates the ground, and attends the weekly markets, and urges the labor of his servants, and studies the soil and the seasons; or, as a common laborer, he plies his daily task from morning to night, then throws his weary limbs on a couch of straw, and then rises with the lark, and plies his unvarying task from morning till night again; —nay, look at the lowest of the low, at the common beggar, who extorts charity by some well-feigned tale; or the nightly pilferer, who lives by the dexterity of his petty thefts; look, I say, at the ability, the zeal, the perseverance with which these perform their several tasks, and you will be forced to confess, that he who should, with equal assiduity, apply the powers of his body and mind to the keeping of the Sabbath, or to any other course of religious duty, however severe and arduous, would rise at once to a height of piety, which would put to utter shame the religious pretensions of the common Christian.

Why, then, are our religious duties neglected, or inadequately performed? Not evidently from want of talents or of energy; but for this simple reason, they are not the object of our affections; we feel no interest in the performance of them; the things of time are more congenial to our hearts than the things of eternity. We love Mammon more than God.

Assuredly, if the mind were unbiased by this strange perverseness, and unoccupied by a most undue and irrational love for those things which perish in the using, there would not be wanting sufficient inducements to seek the things which concern our everlasting peace. How comes it that we do not love God? He is our Creator, Preserver, and Lawgiver; and He so loved us, that He gave his only begotten Son to save us. How comes it that we feel so little affection for the Saviour? He offers us eternal life. He died to bestow this blessing upon us; and, assuredly, his generous and surpassing kindness addresses itself to every rational and tender feeling of our heart. The children of this world are, indeed, wise with regard to the things of the present life; but what shall we say of them in the view of eternity, except that they are altogether reckless and unwise!

Considered in a religious light, the various characters which exist in the Christian world, may be reduced to the two alluded to by our Saviour,—the children of this world and the children of light. On those who belong to the former class, all motives and all arguments have been urged in vain. A thousand appeals have been made to their sense of duty, of interest, and of gratitude, but in vain. In vain have they been exhorted to obey their Creator and Redeemer; in vain have they been warned to flee from the wrath to come. They have been reminded of the glory, honor, and immortality which awaits believers; they have been adjured by the love of God, and by the mercy and compassion of Christ, but all in vain. They have listened to these appeals, and have been roused, perhaps, for a moment; but they have fallen again into their deep sleep; or have only remained awake, that reflection might be drowned in the intoxicating cup of the world, which they again empty to the very dregs.

Neither has the warning voice of Providence power to gain admittance to their hearts. Alas! in what expressive language does God speak to our souls, in the events which are daily passing around us! How solemnly, how pathetically, does He warn us, that our treasure is not on earth; that there is here no continuing city or place of

abode! How painfully are we reminded that human strength is but a shadow; that human pleasure is but a dream; that life itself is but a vapor, which appeareth for a little time, and then vanisheth away. Men see their hopes blasted, their enjoyments fading, their friends, one by one, perishing around them;—and what is the consequence? They shed a tear; they breathe a sigh; they say all is vanity; and then, (O strange infatuation!) they return with greediness to those very pursuits of which they have seen the emptiness and the termination.

Such is the state of those who are emphatically called the children of this world. But there are others on whom these appeals and warnings produce a very different effect. At one period of their lives, they were perhaps as callous and unmoved as their fellows; but now they are awakened, and they wonder at the weakness and perverseness of their former selves, being sensible that "there is no profit in those things of which they are now ashamed." These have become impressed with the importance of spiritual truths. They realize to their souls the doctrines of the Gospel, and behold all things in a new light. The love of God is shed abroad in their hearts, and gratitude to their Redeemer glows in every feeling of their souls. They hear the warning voice of Providence in every event of their lives. "In prosperity they are joyful, in adversity they consider;" deeply sensible that it is God who "has set the one over-against the other." When they are in distress, they "sorrow not as others who have no hope." When they rejoice, their gladness is a foretaste of the joy of angels. They possess, in short, that faith "which is the substance of things hoped for, the evidence of things not seen:" which exhibits time in its true light, and realizes the eternal world.

Whence this difference, so entire, so universal, so astonishing? How comes it that human beings should be so opposite to each other in their feelings, their desires, and their affections? Nay, how does it happen, that the very same individual should, at different periods of his life, be so opposite to his former self? Is it by his own efforts that this change is effected? Does he exert his own mental

energies, merely when he is renewed in the spirit of his mind,—when he dies and lives again; and, throwing aside, like a chrysalis, his earthly coil, soars, as it were, a new creature, in a new element?

If our deliverance depended on our own unaided strength, what anxiety, what despair might not a sense of our weakness and perverseness occasion! But when we remember, that He who is All-good and All-sufficient, has promised to do every thing for us, if we will only employ the means which He affords, and cast ourselves entirely on the teaching of his Spirit, it is still, "with fear and trembling" indeed, but it is also with confidence and joy, that we "work out our own salvation."

The promises of Divine aid, to those who desire it, are numerous and express. "Ask and ye shall receive, seek and ye shall find, knock and it shall be opened unto you." "All things, whatsoever ye ask in prayer believing, ye shall receive." "Those who come unto me, I will in no wise cast out." "If a son shall ask bread of any of you that is a father, will he give him a stone? Or if he ask a fish, will he for a fish give him a serpent? Or if he ask an egg, will he offer him a scorpion? If ye then, being evil, know how to give good gifts unto your children, how much more shall your heavenly Father give the Holy Spirit to them that ask Him?"

These, and many other promises, give to the believer hope and confidence. He is assured, that "what the law could not do, in that it was weak through the flesh, is accomplished by Him who came in the likeness of sinful flesh," and who has declared that his grace is sufficient for those who trust in it. It was this which supported Paul, when, deeply affected by the perverseness of his fallen nature, he exclaimed, "O wretched man that I am, who shall deliver me from the body of this death!" and immediately checking himself, he exclaimed, "I thank God, through Jesus Christ our Lord! There is now no condemnation to them which are in Christ Jesus, who walk not after the flesh but after the spirit." These sentiments breathe the very spirit of our Christian faith; and it is thus that "he who humbleth himself is exalted;" and Divine strength is made perfect in human weakness.

TENTH WEEK—MONDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—EGYPT, THEBES.

In giving an historical sketch of ancient architecture, I commence with Egypt, not because it contains specimens of the art which can be proved to be the most ancient, but because its ruins are in many respects the most remarkable and imposing which the world contains. The early history of the art, however, is lost in the gloom of antiquity. The devastating conquests to which the ancient Egyptians were subjected, have destroyed the memorial of their internal transactions, and placed the records of their arts out of the reach even of the earliest historians. Herodotus only commences his account after the seat of empire had been translated from Thebes to Memphis, and his personal knowledge of the country was not acquired until a hundred years after Cambyses had laid the unrivalled edifices of Upper Egypt in ruins. The origin and progress, therefore, of the powerful state which erected these imperishable traces of its ancient glory, are totally unknown to us.

From the magnificent description of Thebes by Homer, we learn that it had risen to great importance previous to the Trojan war, or about 1200 years before the Christian era. Cambyses invaded Egypt about 700 years subsequent to this period, and the inhabitants had, during this long interval, continued to flourish, and to increase in wealth and population. This seems to have been a sufficient extent of time for the accomplishment of those mighty works which have immortalized the Thebaid.

With the invasion of Cambyses terminated the splendor of Upper Egypt. He carried with him, not only conquest, but destruction. His warfare was not merely with the people, but with their palaces and religious houses. He bore off in his triumphal train, the artists as well as the spoils; leaving this once-splendid valley a hopeless

scene of desolation. And to add to its deplorable condition, two centuries afterwards war again visited it with exterminating fury, under the ruthless hand of the destroyer of the dynasty of Cambyses. And yet, such is the indestructible nature of these gigantic efforts of art, that, notwithstanding the repeated attacks of those not less powerful enemies, the Romans, united to the natural waste of three thousand years, the ruins of Upper Egypt still continue so magnificent as to form a theme of astonishment and admiration, even to the present enlightened age.

Upper Egypt contains structures of three distinct forms. —1st, The simple pyramid ; 2d, Apartments enclosed by sculptured walls, with flat roofs, supported by rows of columns, and connected by open porticoes ; and, 3d, Caverns, grottoes, or tombs.

It would be inconsistent with the design of this work to enter into any lengthened description of the various ruins of this wonderful country of the dead; but some account of the remains of the ancient metropolis itself, the date of whose destruction is far anterior to the first erection of the most celebrated cities of Greece and Rome, cannot fail to be interesting and instructive.

The sentiment which first strikes the mind of the traveller, in viewing this immense ruin, is that of surprise and awe at the enormous size of the materials, and the extraordinary efforts of human power which have been lavished in their erection. Sonnini describes his sensations, "not as simple admiration, but as an ecstasy which suspended his faculties, rendered him immovable with rapture, and inclined him to prostrate himself in veneration of such monuments, the rearing of which appeared to transcend the strength and genius of man." Denon assures us, that "the whole French army, coming suddenly in sight of the ruins, with one accord stood in amazement, and clapped their hands with delight, as if the end and object of their glorious toil, and the complete conquest of Egypt, were accomplished and secured, by taking possession of the splendid remains of this ancient metropolis."

The following is a plain and unexaggerated account of

the general appearance of the scene, by a sensible British traveller. "It is difficult to describe the noble and stupendous ruins of Thebes. Beyond all others they give you the idea of a ruined, yet imperishable city; so vast is their extent, that you wander a long time, confused and perplexed, and discover at every step some new object of interest. From the temple of Luxor to that of Karnac is a mile and a half; and they were formerly connected by a long avenue of sphinxes, the mutilated remains of which, the heads being broken off the greater part, still line the whole path. Arrived at the end of this avenue, you come to a lofty gateway of granite, quite isolated. About fifty yards further, you enter a temple of inferior dimensions; you then advance into a spacious area, strewed with broken pillars, and surrounded with vast and lofty masses of ruins, all parts of the great temple. A little on your right, is the magnificent portico of Karnac, the vivid remembrance of which will never leave him who has once gazed on it. Its numerous colonnades of pillars, of gigantic form and height, are in excellent preservation, and without ornament; the ceiling and walls of the portico are gone; the ornamented platstone still connects one of the rows of pillars with a slender remain of the edifice attached to it. Passing hence, you walk amidst obelisks, porticoes, and statues; the latter without grace or beauty, but of a most colossal kind. If you ascend one of the hills of rubbish, and look around, you see a gateway standing afar, conducting only to solitude; and detached roofless pillars, while others lie broken at their feet; and the busts of gigantic statues appearing above the earth, while the rest of the body is yet buried, or the head torn away.

"The length of the great temple of Karnac is estimated at 1200 feet, and its breadth at 400; and among its hundred and fifty columns are two rows, each pillar of which is ten feet in diameter. On the left spread the many deserts of the Thebais, to the edge of which the city extends. In front is a pointed and barren range of mountains. The Nile flows at the foot of the temple of Luxor; but the ruins extend far on the other side of the

river, to the very foot of those formidable precipices, and into the wastes of sand."*

The whole character of Egyptian architecture is that of gloomy grandeur and sublime vastness. Every thing indicates the ambition of taxing the human powers to the utmost in producing these effects; and the success of the effort is truly astonishing, especially if we take into account what we are bound to believe of the imperfect state, at that early period, of the mechanical arts. Modern machinery, if applied to such an object, might easily be made to effect greater wonders; but how man could, without the use of those powers, which have bestowed upon him a strength immensely surpassing his own, detach from the living rock, convey to great distances, and erect on high buildings, those immense blocks which baffled the vindictive rage of the destroyer, or wearied his perseverance,—has in every age, and not less in our own, confounded the conjectures of the most learned and ingenious antiquaries, and eluded the calculations of the most scientific artists.

TENTH WEEK—TUESDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—EGYPT, THE PYRAMIDS.

THE most peculiar and remarkable of all architectural efforts, whether we consider their nature, or the toil expended in their erection, are assuredly the Egyptian Pyramids. For thousands of years those huge masses of solid masonry have withstood the ravages of time, and the rage of hostile armies. They continue, and to the end of time will continue, imperishable monuments of human power and vanity.

There is something very marked and characteristic in Egyptian architecture. Its peculiar feature, as we have

* Carne's 'Travels in the East.'

said, is an awful and stern sublimity; but its mysterious vastness, and severe simplicity, are without grace and without beauty.* From these properties, however, the most powerful, if not the most refined and agreeable emotions are experienced. "Long withdrawing lines," says a talented writer in the 'Edinburgh Encyclopedia,' "unbroken surfaces, large masses, simple contours, even should the individual forms be destitute of proportion and grace, will always produce grand and solemn effects, capable of being carried to the majestic and sublime. Thus, in viewing the temples scattered over the Thebaid, those very edifices characterized by Strabo, as 'barbarous monuments of painful labor;' and in contemplating the pyramids, whose outline is without variety and contrast, the imagination is exalted to a high pitch of awe and astonishment. But these lofty efforts arise from a principle merely accidental; they are not the fruits of intrinsic science or refined art."†

The writer we have quoted, justly attributes this peculiar style of architecture to the predominant influence of the Egyptian priesthood, whose policy it was to perpetuate their power by investing themselves, and the productions of their domination, with a character of immensity and of permanence. The eternal durability to which, in all their designs and institutions, they aspired, necessarily pointed out a style, retaining, as the most substantial, only the simplest forms and the largest masses.

In the pyramids this character is peculiarly marked. Whatever was their immediate object, it is obvious that the whole resources of art were employed to render them indestructible. Standing on an immensely extended base; tapering to a narrow top; within, compact and solid; without, formed of heavy blocks of stone, whose

* [They who have been in the habit of studying, with an impartial eye, the forms of Egyptian architecture, in good representations of them, will dissent from the opinion expressed above, and be disposed to maintain, that some of these forms, for instance, the lotus-like capitals, possess a large share of grace and beauty. The prevailing characters of this architecture, however, are, without doubt, solidity, solemnity, mystery. —Am. Ed.]

† 'Edinburgh Encyclopedia,' article 'Sculpture.'

size has excited the astonishment of all beholders ; nothing seems to have been left unthought of, or undone, which could tend to produce that one object, durability, coextensive with that of the earth on which they were founded. What the more direct and particular intention of their erection was, seems still to be matter of doubt. Some persons have supposed, that they were temples erected in honor of a deity, and an attempt has been made to prove that this deity was the sun, the first and greatest god, in almost every heathen calendar. Considering them in this light, a fanciful writer remarks, that "it was natural to build them in that shape which the rays of the sun display when discovered to the eye, and which men observed to be the same in terrestrial flame ; because this circumstance was combined in their imaginations with the attribute they adored. If they were temples dedicated to the sun," he adds, "it seems a natural consequence that they should likewise be places of sepulture for kings and illustrious men, as the space which they covered would be considered as consecrated ground."*

That one of the uses of these enormous buildings, was, to form receptacles for the dead, is generally believed; and that they were so employed, has been placed beyond conjecture, by the fact of sarcophagi and human bones having been found in them. Perhaps it is refining too much to look further for their object. It is well known, that the ancient Egyptians spared neither labor nor expense in preparing the tombs, and preserving the bodies of their dead. This was probably the only immortality to which they looked forward, and their prejudices rendered it dear; for they imagined that so long as the body remained undecayed, the living principle continued to inhabit it. Near their chief cities, accordingly, are always found extensive ranges of tombs. In Upper Egypt, these were formed by excavations in the sides of the adjacent rocky mountains, which were executed with such laborious art, that to this day they form a striking contrast with

* 'Gentleman's Magazine,' for June, 1794.

the rudeness of the surrounding desert. The pyramids are erected in the northern extremity of this wonderful valley, in the neighborhood of Memphis, the second capital of that ancient kingdom; and may have been intended to supply the want of mountains in that immediate neighborhood, for the construction of mausoleums, if we are to believe that they are the work of this second period in the Egyptian history. They certainly are not unlike an imitation of mountains; and what might be supposed to favor this opinion, is, that a hill in the neighborhood of the pyramids, has been actually shaped by art into the pyramidal form, thus, by a kind of reaction, causing Nature to copy back from art, what art had originally copied from Nature.

The pyramids stand upon a plain about fifty miles long, stretching parallel to the Nile. This plain, which, beneath the soil, is composed of hard calcareous rock, is about eighty feet above the level of the river, and forms an elevated platform, which gives a more imposing effect to those immense masses, as the traveller ascends from the lower valley. The three largest pyramids are in the neighborhood of Ghizi,* and bear the name of this village. The dimensions of the largest are differently given by travellers; but it is probably between five and six hundred feet high, and about seven hundred feet square at the base.† It is ascended by steps, diminishing in height from four to two and a half feet, in approaching the top. Upon the top there is a platform thirty-two feet square, consisting of nine large stones, each about the weight of a ton, though inferior to some of the other stones, which vary in length from five to thirty feet. The

* [This place is spelled in different ways, sometimes Gizeh, and sometimes Djizeh. The difference probably arises from the difficulty of expressing the native word in our own alphabet with precision.—Am. Ed.]

† [The height of the Great Pyramid, sometimes called the Pyramid of Cheops, is more usually stated at from four hundred and fifty to five hundred feet. In Percival's edition of 'Malte-Brun's Geography,' it is fixed at four hundred and seventy-seven feet, which is forty feet higher than St. Peter's church at Rome, and one hundred and thirty-three feet higher than St. Paul's at London. The length of the base, is stated at seven hundred and twenty feet.—Am. Ed.]

stones are generally of the same nature as the calcareous rock on which the pyramids stand; and, although Herodotus asserts that they were brought from the western side of the Nile, it is more probable that they were quarried in the immediate neighborhood. The pyramids are built, externally, with common mortar; but no appearance of any cement can be discovered in the more perfect masonry of the interior. The four sides of these masses are directed to the cardinal points, and their north face is said to be nearly in the plane of the earth's equator. This might be held as an additional argument in favor of their relation to the worship of the sun.

The Pyramids of Sakhara, extend five miles to the north and south of the village of that name. One of them is said to equal in dimensions that which has already been mentioned. The others are considerably inferior. There is one built of unburnt bricks, containing shells, gravel, and chopped straw, which is in a very mouldering state.

It would appear from the accounts of the ancients, that the Great Pyramid was originally covered from top to bottom with a coating of very hard marble. Mr. Savary is of opinion, that the ruins of the covering of the pyramid, and of the stones brought from within, buried by the sand, which is continually accumulating, have covered up the base to the depth of two hundred feet. It is certain, at least, that much of the height is lost by this means. The great Sphinx, which is placed near the second pyramid, and is itself of enormous bulk, was, in the time of Pliny, upwards of sixty-two feet above the surface of the ground. Its whole body is at present buried under the sand. Nothing more of the figure appears than the neck and head, which are twenty-seven feet high.*

* Captain Caviglia succeeded in laying the Sphinx bare to the foundation, for the distance of a hundred feet in front, and discovered some buildings and inscriptions. The whole body, as far as examined, was cut out of the live rock, except the paws, which were of masonry, and fifty feet long. The whole length of the figure is a hundred and forty-three feet,—the height from the belly to the top of the head sixty-two feet.—*Library of Entertaining Knowledge—Pyramids.*

How deep and solemn are the reflections naturally arising from the consideration of these amazing relics of antiquity. Thousands of years have passed away since the living beings whose inventive powers conceived them, whose ambition decreed them, and whose laborious exertions constructed them, perished from this world. A hundred generations have since arisen, and been laid in the dust. The face of nature has itself changed. The Nile, indeed, has continued, with unvarying certainty, periodically to overflow its banks, and give luxuriance to the celebrated Delta, on which these wonderful productions of art are placed; yet even its uniform operations have contributed to alter the aspect of the region over which its fertilizing waters have yearly passed. But another cause, of a very different nature, has been more actively at work. The sand of the desert has invaded the soil, which in those distant ages was rich and beautiful as a cultivated garden, and has buried deep beneath its dreary wastes, at once the bountiful vegetation of nature, and the useful and varied labors of industrious man. Yet these enormous erections still rear their heads amidst such changes, themselves almost unchanged, and promising to be coeval with Nature itself. Strange and enduring monuments at once of human strength and weakness, of human wisdom and folly! The very names of those mighty and aspiring men who founded them, have, for more than twenty centuries, passed away; or, if the names of some of them have remained, it is but to tell that such men wore out their earthly span, and then gave their mouldering bodies to these undecaying tombs. O empty ambition! what a beacon hast thou erected to a thoughtless and perishing world!

The Pyramids, those mountain heaps of stone,
The temples rear'd by human pride to Fame,
Remain to mock old dynasties o'erthrown,
And kings that built them, now without a name.
Unscathed by earthquake, thunder, flood, or flame,
And Time, that ruins all, each still uprears
Its tapering top to the bright heaven, the same
That has defied four thousand ruthless years:
But man, the builder vain, how feeble he appears!*

* [The Editor is induced to subjoin in this place a Sonnet on the

TENTH WEEK—WEDNESDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—INDIA, EXCAVATED TEMPLES.

BETWEEN the Egyptian and Indian architecture, there is a wonderful similarity, which seems to indicate a common origin; but the history of both, is so enveloped in the mist of remote antiquity, that no trace of this appears in their records. In both, they had their excavated dwellings, temples, and tombs; in both there were pyramids, and buildings of sculptured walls ornamented by pillars. In the extent of their ancient cities, too, there is a resemblance, indicating a similarity of manners.

If we are to give credit to ancient history, the city population of India, in very remote times, was immense. Oude, the capital of the province of that name, is said to have been the first regularly built city in India. Sir William Jones observes of it,—"This city extended, if we may believe the Brahmins, over a line of ten yojuns, or forty miles." Delhi, a city founded about 300 years

Pyramids, by Edward C. Pinkney, an American poet, who died young, and is known to but few to have lived. He was a son of that accomplished lawyer, statesman, and orator, William Pinkney of Baltimore.

THE PYRAMIDS.

All former use outlived, or trust betrayed,
A marvel and a mystery ye stand
In grandeur on the old Egyptian sand;
And lapsing years your giant-forms have made
Temples of Time!—to which the homage paid
By thoughtful pilgrims from each younger band,
Is greater than a memory might command,
However in sublimity arrayed.
Whether the Macedonian victor slept
In some small nook within the walls of one,
Or your own humbler monarchs in you kept
Ancestral ashes from the loathing sun,
Or slaves for their wise relative here heaped
An unmeant tomb—to us is all unknown.]

before Christ, is said at one period to have contained two millions of inhabitants. It continued the capital of Hindostan till 1738, and, after experiencing many reverses, was finally destroyed in 1760. Besides these, there were two other imperial cities, Lahore and Agra, both of them remarkable, in ancient times, for their wealth and splendor, and especially for the magnificence of the palaces with which they were adorned. There were also many others remarkable for the extent of their population and riches ; and of these may be mentioned Chundery, which is said to have contained three hundred and eight-four markets, and three hundred and sixty caravanserais ; and Achmedabad, once so large as to require to be divided into three hundred and sixty districts.

These extensive and proud cities, were evidently the result of the peculiar policy of the Eastern potentates, and symbols of their power ; and, along with that policy and power, they have passed away, and have left little more than heaps of mouldering ruins, as traces of their ancient magnificence.

It is not, however, from their palaces or private buildings, so much as from their temples, that we are enabled to judge of the peculiar character of Indian architecture. Of these, which, are called pagodas, we find accounts of five different forms ; 1st, Excavations in the rocky mountains ; 2d, Simple pyramids, constructed, as in Egypt, of large stones, diminished by regular recesses or steps ; 3d, Square or oblong courts, of vast extent ; 4th, Buildings in the form of a cross ; 5th, Circular edifices. A short description of the first, perhaps the most ancient kind of these places of worship, must suffice.

These excavations are numerous and extensive. In some instances, they are perfectly plain ; in others, they are highly and laboriously ornamented. We are told of a place so far north as the Subat of Cashmere, in the middle of the mountains, where twelve thousand apartments are cut out of the solid rock. This was well known to the Greeks, and was considered as a spot of peculiar sanctity. It was named Parapamis, from Para Vami—the pure city—commonly called Bamaiya. The figure

of the serpent is there found sculptured in seven hundred places.

Most of these remarkable excavations are too remote from common observation to be minutely described; but those which I am now about to mention, have attracted the notice and admiration of many scientific travellers. The three principal temples of this description, are those of Elephanta, Salsette, and Vellore, or Ellora.

Elephanta is situated near Bombay, in an island, so named from the gigantic figure of an elephant cut in the rocks on the south shore. The grand temple is one hundred and twenty feet square, and supported by four rows of pillars. Along the side of the cavern are forty or fifty colossal statues, from twelve to fifteen feet high, of good symmetry, and, though not quite detached from the rock, boldly relieved. Some have a helmet of pyramidal form; others a crown decorated with devices; and others, again, have only bushy ringlets of flowing hair. Many of them have four hands, some six, holding sceptres and shields, symbols of justice and religion, warlike weapons, and trophies of peace. Some inspire horror, others have aspects of benignity. There is a great bust, the face of which is five feet long, and the breadth, across the shoulders, twenty feet.

At the west end of this pagoda is a dark and unornamented recess, with an altar in the centre; and at each of the four doors by which it is entered, are two naked statues of good sculpture, and gigantic dimensions. At the entry of the excavation, and round its body, are extensive verandas. Canara, in the island of Salsette, also near Bombay, is represented by Leuschotten, who visited it in 1759, as being like a town. He describes the front as hewn out of the rock, into four stories or galleries, in which there are three hundred apartments: These apartments have generally an interior recess. The grand pagoda is forty feet high to the soffet* of the arch or dome. It is eighty-four feet long, and forty-six broad. The portico has five columns, decorated with bases and

* [Or soffit. It is the interior sweep of an arch.—Am. Ed.]

capitals. Immediately before the entrance into the grand temple, are two colossal statues, twenty-seven feet high, which have mitre-caps and earrings. Thirty-five pillars, of an octagonal form, about five feet in diameter, support the arched roof of the temple. Their bases and capitals are composed of elephants, horses, and tigers, carved with great exactness. At the further end is an altar, of a convex shape, twenty-seven feet high, and twenty feet in diameter, directly over which is a large concave dome cut out of the rock. Immediately about this grand pagoda, there are said to be ninety figures of idols, and not fewer than six hundred within the precincts of the excavations. The walls are crowded with figures of men and women, engaged in various actions, and in different attitudes; along the cornices are figures of elephants, horses, and lions, in bold relief; and above, as in a sky, genii and dewtahs are seen floating in multitudes.* It is supposed by Mr. Grose, that the labor expended in constructing the works of Elephanta and Salsette, must have equalled that of erecting the pyramids of Egypt.

But, magnificent as are these excavations, they are surpassed by those in the neighborhood of Vellore. Sixteen of these early efforts of human skill have been minutely described by Sir C. Mallet, in a paper published in the sixth volume of the Asiatic Researches. I shall not, however, stop to describe any of these, as enough has already been said to convey some idea of the general character of those ancient works, and to afford some faint idea of the amazing expense of ingenuity and labor, which the religious feelings of remote antiquity called forth. In contemplating them, we cannot fail to be reminded, how deeply a sense of the unseen world is seated in the human heart, and how mighty is its influence on the conduct, even when debased by ignorance and deformed by superstition. It were well, if a more exalted and enlightened faith, in chasing away the darkness and phantoms of an idolatrous age, should retain an equal hold on the heart and affections of its professed votaries.

* [The genii or jinee, are a kind of fairies, and the dewtahs or devetas, are inferior gods, in the wild mythology of India.—Am. Ed.]

It is melancholy to reflect that the gigantic efforts of these ancient times were made, not in support of truth, but of falsehood; not for the real interests and advancement of the human mind, but for riveting the chains of ignorance, superstition, and vice. It was the triumphant work of the powers of darkness. The extent of this malignant influence never appears so tremendous or appalling, as when men are persuaded willingly to labor for their own enthralment, and to forge the chains which are to bind degradation on their souls.

These remarks may be extended to the whole history of antiquity, as connected with architecture; but they especially come home to the bosoms of Britons, in looking at India. If, for the emancipation of that important and interesting portion of the globe, from this spiritual tyranny, but half the pains had been taken in these more enlightened times, which, in a dark and fanciful age, were employed for their mental subjugation, what a glorious revolution might have been effected.

Assuredly, on Christian Britain this obligation lies; or, rather, to Britain this high privilege belongs. It was not for the mere secular aggrandizement of this highly-favored country, that one hundred and thirty millions of men at the furthest extremity of the world, have been cast on her protection; nor can she acquit herself of the honorable task thus imposed, till the sound of the Gospel be echoed from shore to shore over those wide-spread plains, and from the pagoda and the mosque, converted into Christian churches, the glad tidings of salvation be borne into the hearts of the people.

TENTH WEEK—THURSDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—CENTRAL ASIA—TOWER OF BABEL, OR TEMPLE OF BELUS—BABYLON.*

On Mount Ararat, in Central Asia, the ark rested which saved the remnant of living beings from the ravages of the Universal Deluge. It was, therefore, in this region that the renovated world was first peopled, and from this, as their common centre, the human race diverged to store the earth with intelligent beings. We should, therefore, look here especially for the earliest specimens of architectural ingenuity and labor; and, in fact, there is at least one remnant of the remotest antiquity in this locality. I allude to what is believed to be the ruined Tower of Babel. On the Plain of Shinar, vestiges of this extraordinary edifice, which is connected with so remarkable an era in the history of the human race, are still to be traced. It was, in many a succeeding age, used as a temple of Belus,† the Baal of Scripture, and was, according to the testimony of ancient authors, half a mile in circumference,

* For much of the information contained in this, and some subsequent papers, I am indebted to the indefatigable and judicious labors of Dr. Keith, in his excellent work on 'Fulfilled Prophecy,' a careful perusal of which I earnestly recommend to the youthful student.

† In the very short account of the building of the Tower of Babel, which we find in Scripture, the intentions of the builders are, in our translation, rendered in these words, "And they said, go to, let us build us a city, and a tower whose top *may reach* unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth," (Gen. xi. 4.) The words in italics are not in the original. This clause of the verse, literally rendered, would be, "A tower whose top unto heaven." Some ingenious critics have supposed that the meaning of these obscure words was, that the top of the tower should be devoted to the worship of heaven, or of the sun, the god of heaven. If this criticism do not seem to be overstrained, it will remove much difficulty from the passage, and correspond with what history records of the subsequent use of this immense fabric. The confusion of tongues will then appear to be a judgement on mankind for deserting the worship of the true God.

and a furlong in height. It was originally built of a pyramidal form, of eight successive towers, each seventy-five feet high, rising above each other, and diminishing in size, to that which crowned the whole, and formed the *Sanctum Sanctorum* of the god of fire. Its ascent was by an inclined plane, which passed eight times round the tower. It is now consolidated into one irregular hill, exhibiting a different aspect, and of different altitudes, from whichever side it is viewed. "The eastern face," says an intelligent traveller, "presents two stages of hill, the first showing an elevation of about sixty feet, cloven in the middle into a deep ravine, and intersected in all directions by furrows channelled there by the descending rains of succeeding ages. The summit of this first stage stretches in rather a flattened sweep, to the base of the second ascent, which springs out of the first, in a steep and abrupt conical form, terminated on the top by a solitary standing fragment of brick-work, like the ruin of a tower. From the foundation of the whole pile, to the base of this piece of ruin, measures about two hundred feet, and from the bottom of the ruin to its shattered top, are thirty-five feet. On the western side, the entire mass rises at once from the plain in one stupendous, though irregular, pyramidal hill, broken in the slopes of its sweeping acclivities, by the devastations of time, and rougher destruction. The southern and northern fronts are particularly abrupt."*

On the summit of the hill are immense fragments of brick-work, of no determinate figures, tumbled together and converted into solid vitrified masses. Some of these huge fragments measured twelve feet in height, by twenty-four in circumference; and, owing to the circumstance of the standing brick-work having remained in a perfect state, the change exhibited in these is only accountable from their having been exposed to the fiercest fire, or rather scathed by lightning. They are completely molten, and the ruined mass in parts resembles, what the Scriptures prophesied it would become, "a burnt mountain."† "Through the whole of these awful testimonies

* Sir R. K. Porter's 'Travels,' vol. ii. p. 310. † Jeremiah, li. 25.

of the fire," says the writer already mentioned, "whatever fire it was which hurled them from their original elevation, the regular lines of the cement are visible, and so hardened, in common with the bricks, that, when the masses are struck, they ring like glass. On examining the base of the standing wall, contiguous to these huge transmuted substances, it is found tolerably free from any similar changes,—in short, quite in its original state; hence, I draw the conclusion, that the consuming power acted from above; and that the scattered ruin fell from some higher point than the summit of the present standing fragment. The heat of the fire, which produced such amazing effects, must have burned with the force of the strongest furnace; and from the general appearance of the cleft in the wall, and these vitrified masses, I should be induced to attribute the catastrophe to lightning from heaven. Ruins, by the explosion of any combustible matter, would have exhibited very different appearances."

There is something exceedingly striking in this account. It seems as if this doomed building, which was founded in impious rebellion, and afforded in its earliest history a signal instance of Divine interference, should, after a long period, during which it was devoted to the service of idolatry, and perpetuated the rebellion it had commenced, be destined again to experience the vengeance of the insulted Deity, and to perish at last by fire from heaven, leaving to remote ages an indelible impression of the Omnipotent hand which struck it.

This state of the ruins fulfils another remarkable prophecy concerning its fate. "They shall not take of thee a stone for a corner, nor a stone for foundations; thou shalt be desolate for ever."* The vitrified masses on the summit of Birs-Nimrood, as ancient Babel is now called, cannot be rebuilt. Though still they be of the hardest substance, and indestructible by the elements, yet, incapable of being hewn into any regular form, they neither are, nor can now be taken as materials for building. Even of the unscathed bricks, indeed, on the solid fragments of wall, travellers

* Jeremiah li. 26.

say, that they are so firmly united by cement, that "it is utterly impossible to detach any of them."

At the present day, there are fewer vestiges of very ancient buildings left in Central Asia, than might have been expected, from the accounts which have been handed down to us of the early civilization, and the magnificent and stupendous works, of this cradle of the world. This has been justly attributed to the devastating effects of conquest, and to the perishable nature of the materials of which their buildings were usually constructed. When we remember, that, from a deficiency of stone, they commonly made use of brick, and that these fertile but unfortunate regions have, since the dominion of the Assyrians, been successively overrun by the Medes, the Persians, the Greeks, the Romans, the Saracens, and the Turks, we shall cease to wonder at the utter destruction which has so generally been effected.

Babylon and Nineveh appear both to have existed at the same time, and to have been nearly of the same magnitude,—namely, from fifty to sixty miles in circumference. The accounts which ancient authors, apt to exaggerate, have given of the architectural wonders which these cities displayed, must perhaps be taken with some degree of distrust; but when we consider the facility which the state of society afforded, for the employment of vast masses of people in the construction of public works, we shall not find it necessary to make the abatements, which, judging from their want of mechanical power, we might otherwise think necessary. The taste of the people of remote antiquity was remarkable every where for a love of cumbrous vastness. Magnitude was the sentiment which chiefly entered into their idea of architectural magnificence. Their rulers, whether civil, military, or ecclesiastical, were all imbued with the same propensity; and the public works which they produced partook of the same character. The ancient nations of the East were little else than powerful bands of robbers, associated together, under chiefs, for the purposes of conquest and plunder. They spoiled the surrounding countries of their wealth, and heaped it up in their own treasuries, or lav-

ishly used it, in seasons of peace, for affording employment and subsistence to their swarming myriads, in the erection of those structures, either for the purposes of security, or of luxury and pride, the extent of which fills us with astonishment.

Babylon was situated in the extensive plain of Shinar, at the top of the luxuriant Delta, formed by the Euphrates and the Tigris. It was probably founded by Nimrod, about the same time as the celebrated tower,—that is, at an early period after the flood; but history informs us, that it was rebuilt by the celebrated Assyrian Queen Semiramis, twelve hundred years before the Christian era, and enlarged and perfected by Nebuchadnezzar, about six centuries afterwards. The walls which encompassed the city, are said by Herodotus, probably with great exaggeration, to have been three hundred and eighty feet high, and eighty-seven feet in thickness. They were built of brick, laid in mortar made of bitumen, and surrounded by a ditch, out of which the bricks had been made. They were afterwards reduced to the height of fifty cubits, by Darius Hystaspes.

The present state of this once magnificent city, demonstrates the instability of all earthly greatness, while it exhibits a very striking instance of the fulfilment of prophecy. It was foretold of this place, which seemed formed to resist all powers of decay, that it should "become heaps;" and nothing can more graphically describe its present ruinous condition. Immense tumuli of temples, palaces, and human habitations of every description, form, in all directions, long and varied lines of ruins, which in some places "rather resemble natural hills, than mounds covering the remains of great and splendid edifices."* "Long mounds, running from north to south, are crossed by others from east to west," and are only distinguished by their form, direction, and number, from the decayed banks of canals. "Our path," says Captain Mignan, "lay though the great mass of ruined heaps on the site of 'shrunken Babylon;' and I

* Porter's 'Travels,' vol. ii. pp. 294—297.

am perfectly incapable of conveying an adequate idea of the dreary, lonely nakedness which lay before me."* "The decomposing materials of a Babylonian structure," again observes Sir Robert K. Porter, "doom the earth, on which they perish, to lasting sterility. On this part of the plain, both where traces of buildings were left, and where none had stood, all seemed equally naked of vegetation, the whole ground appearing as if it had been washed over and over again, by the coming and receding waters, till every bit of genial soil was swept away; its half clayey, half sandy surface, being left in ridgy streaks, like what is often seen on the flat shores of the sea, after the retreating of the tide."

It is particularly worthy of remark, that of the immense walls of this ruined city, not a trace remains. "The broad walls of Babylon," said the prophet, "shall be utterly broken down;" and this prophecy has been fulfilled to the letter. Some slight remains of the arches on which were spread the hanging gardens attached to the walls, may here and there be remarked; but as to the walls themselves, Mr. Rich observes, "I have not been fortunate enough to discover the least trace of them in any part of the ruins at Hillah; which," he adds, "is rather an unaccountable circumstance, considering that they survived the final ruin of the town, long after which they served as an enclosure for a park; in which comparatively perfect state, St. Jerome informs us, they remained in his time."† It is curious to attend to the gradual disappearance of these mighty erections. In the sixteenth century, both the inner and outer walls, mentioned by Herodotus, could still be distinctly traced, and are described by Rauwolff, who visited the site, as two ascents, "distinguished by a ditch, and extending themselves like unto two parallel walls a great way about." The bricks, of which they were built, have been carried off, to erect other towns; while the rains of centuries, and the annual inundations of the Euphrates, have completed their extinction.

* Mignan's 'Travels,' p. 139. † Rich's 'Memoirs,' pp. 43, 44.

TENTH WEEK—FRIDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—CENTRAL ASIA—NINEVEH—PETRA.

Little is known of Nineveh, and that little is obscured with fable. Its destruction was effected before the date of authentic profane history, and those ancient historians who have recorded the tradition of its greatness and its fate, could only have been personal witnesses of its ruins. Before Herodotus, the oldest of these historians, wrote, it had long ceased to exist as the habitation of living men. Sacred Scripture, indeed, speaks of it as a city of vast extent, great population, and immense riches; but from the prophetical writings, which alone allude to it, no particular account of the nature of its edifices was to be expected. By heathen historians, its walls are said to have been a hundred feet in height, and sixty miles in compass, defended by fifteen hundred towers, each two hundred feet high. It was twice taken, first by Arbaces, about seven centuries and a half before the Christian era, and then by Cyaxares, after an interval of about eighty years, when it was finally destroyed; and so completely had the work of destruction been effected, that the very place where once it stood and awed the world, was for many centuries unknown, and still remains doubtful. This is one of the doomed cities of holy writ; and the prediction which foretold that the Lord would "make an utter end of the place thereof," that it should become "a desolation, and dry like a wilderness," has been accomplished to the letter.

There were various other stupendous works of art, in these extensive, and now comparatively desert regions, of which ancient history speaks. Among these, the palace of Persepolis, whose ruins are still conspicuous, and the temple of Solomon, are the most remarkable of the era to which I allude. Of Palmyra and Balbec, the wonderful remains belong to a later period, being decidedly of Roman origin.

I shall not, however, stop to give any description of these specimens of ancient art. Of Solomon's magnificent and pious work, an ample description is contained in the sacred volume; and Persepolis, having been built by Egyptian workmen, exhibits too many traces of its origin to require more than a reference to what has been already said on that style of architecture. But there is one very remarkable trace of an ancient city in the southwest quarter of this region, which I must not pass over;—I allude to that of Petra, the celebrated capital of the descendants of Esau. This singular place has only lately been minutely surveyed; and, indeed, little more was known of it than that it was once the site of a flourishing city, till after the commencement of the present century, when it was visited first by Burckhardt, and afterwards, by Captains Irby and Mangles, whose interesting accounts, as quoted by Dr. Keith, I shall follow.*

A narrow and circuitous defile, surrounded on each side by precipitous or perpendicular rocks, varying from four hundred to seven hundred feet in altitude, and forming, for two miles, a sort of subterranean passage, opens on the east the way to the ruins of Petra. The rocks, or rather hills, then diverge on either side, and leave an oblong space, where once stood the metropolis of Edom, and where now lies a waste of ruins, encircled on every side, save on the northeast, by stupendous cliffs, which still show how the pride and labor of art tried there to vie with the sublimity of Nature. Along the borders of these cliffs, detached masses of rock, numerous and lofty, have been wrought into sepulchres, the interior of which is excavated into chambers, while the exterior has been cut from the live rock into forms of towers, with pilasters, and successive bands of frieze and entablature, wings, recesses, figures of animals, and columns. Yet, numerous as these are, they form but a part of the vast necropolis of Petra.† Tombs present themselves, not

* [Yet more recently, the wonderful ruins of Petra have been visited by our countryman, Mr. Stevens, and described by him in a most lively manner in his published Travels.—Am. Ed.]

† [Necropolis means a city of the dead.—Am. Ed.]

only in every avenue of the city, and upon every precipice that surrounds it, but even intermixed almost promiscuously with its public and domestic edifices. "The natural features of the defile," say Captains Irby and Mangles, "grew more and more imposing at every step, and the excavations and sculpture more frequent on both sides, till it presented at last a complete street of tombs."

These travellers, in speaking of the pass which leads to the theatre of Petra, further remark:—"The ruins of the city here burst on the view in full grandeur, shut in on the opposite side by barren craggy precipices, from which numerous ravines and valleys branch out in all directions. The sides of the mountains, covered with an endless variety of excavated tombs and private dwellings, presented altogether the most singular scene we ever beheld." Burckhardt, in describing this scene, after mentioning the excavations, the sepulchres, the mausoleums, (one of which he particularizes of immense dimensions,) the theatre, &c., adds,—"The ground is covered with heaps of hewn stones, foundations of buildings, fragments of columns, and vestiges of paved streets, all clearly indicating that a large city once existed here. On the left bank of the river is a rising ground, extending westwards for nearly three quarters of a mile, entirely covered with similar remains. On the right bank, where the ground is more elevated, ruins of the same description are to be seen. There are also the remains of a palace and of several temples. In the eastern cliff, there are upwards of fifty separate sepulchres close to each other."

Dr. Keith sums up the wonders of this singular city of rocks in these emphatic words:—"The base of the cliff, wrought out in all the symmetry and regularity of art, with colonnades, and pedestals, and ranges of corridors adhering to the perpendicular surface; flights of steps chiselled out of the rock; grottoes in great numbers which are certainly not sepulchral; some excavated residences of large dimensions, in one of which is a single chamber sixty feet in length, and of breadth proportioned; many other dwellings of inferior note, particularly abundant in one defile leading to the city, the steep sides of which

contained a kind of suburb, accessible by flights of steps; niches, sometimes thirty feet in excavated height, with altars for votive offerings, or with pyramids, columns, or obelisks; a bridge across a chasm now apparently inaccessible; some small pyramids hewn out of the rock, on the summit of the heights; horizontal grooves for the conveyance of water, cut in the face of the rock, and even across the architectural fronts of some of the excavations; and, in short, the rocks hollowed out into innumerable chambers of different dimensions, whose entrances are variously, richly, and often fantastically decorated with every imaginable order of architecture,—all united, form one of the most singular scenes that the eye of man ever looked upon, or the imagination painted,—a group of wonders perhaps unparalleled in their kind; but also give irrefragable proof, both that in the land of Edom there was a city where human ingenuity and energy and power must have been exerted for many ages, and to so great a degree, as to have well entitled it to be noted for its strength or *terribleness*, and that the description given of it by the prophets of Israel, was as strictly literal, as the prediction respecting it is true."*

It would be foreign to my purpose to follow Dr. Keith through all the details by which he so strikingly proves the fulfilment of the scriptural prophecies, respecting this extraordinary city, and the territories with which it was connected; but I should not do justice either to my own feelings or to the cause of revealed truth, if I did not record the wonder and delight with which I first perused this successful demonstration. I think no candid man can resist the force of the evidence, arising from the application of the single series of predictions, of which that fated country is the object. Among these, how strikingly characteristic is that which intimates the doom of Petra: —"Thy terribleness hath deceived thee, and the pride of thine heart, O thou that dwellest in the clefts of the rock, that holdest the height of the hill! Though thou shouldest make thy nest as high as the eagle, I will bring

* Keith on 'Fulfilled Prophecy,' pp. 201, 202.

thee down from thence, saith the Lord." "As in the overthrow of Sodom and Gomorrah, and the neighbor cities thereof, saith the Lord, no man shall abide there, neither shall a son of man dwell in it."* Let it not, however, be supposed, that, while I make this remark concerning the fate of the Edomites, I mean to select that people as an example peculiarly striking, of the minute correspondence between the prophecy and the prediction. In every instance where evidence has been collected, that correspondence is most distinct and satisfactory; and the whole of Dr. Keith's work, which, by applying the discoveries of modern travellers, so ably follows out the invaluable labors of Newton, may be considered as one continued and irrefragable proof of the inspiration of Scripture.

TENTH WEEK—SATURDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—GREECE.

Europe, which was destined in later times to be the asylum of the arts and sciences, when in the countries where they originated they became neglected and forgotten, and to excel the old quarters of the world in the progress of the human mind, and the triumphs of genius, was, at the time we have been considering, sunk in the lowest state of ignorance and barbarism. In one quarter, however, it soon began to exhibit symptoms of those inventive powers, and that energy and taste, for which it afterwards became so distinguished. The states of Greece, situated at the southeastern corner of this continent, and enjoying many advantages from the clearness of their atmosphere, the temperature of their climate, and the abundance of their produce, started suddenly and rapidly in the race of improvement. In arts and arms they soon took the lead of all their contemporaries, and even carried back to Asia and Egypt the arts, advanced, refined, and beautified,

* Jeremiah xlix. 16, 18.

which they had originally derived from these early nurseries.

In architecture, especially, and in the kindred art of sculpture, they soon exhibited a peculiar aptitude, which ended in an excellence that may be equalled, but, in the peculiar department which they cultivated, can scarcely be excelled. To imitate these models of taste and elegance has ever since been the highest ambition of succeeding ages.

There was one defect, however, under which the Grecian architects labored, that gave a peculiarity to their works, and restrained them within limits which their successors were enabled to pass. They were ignorant of the properties of the arch, one of the most important of all the principles which have been introduced into architecture. Their model, as I have already observed, was the wooden hut, and this admitted of three simple applications, that of the solid wall of logs, of the transverse beam, and of the upright prop. On modifications of these, the principles of Grecian architecture depended. As the art advanced, they exchanged wood for stone ; and walls of masonry skilfully chiselled and polished, pillars gracefully formed, and massy lintels, all wrought from the quarry, supplied the place of less durable materials. On their pillars, especially, and that part of the building which rested on them, they employed all the resources of their genius. Three orders of architecture hence arose, the Doric, which is simple and majestic ; the Ionic, which is light and graceful ; and the Corinthian, which is ornate and elegant.

Writers on architecture have employed their ingenuity in tracing the origin of these varieties, and of the peculiar figures with which the capitals of their respective pillars are ornamented. It has been fancifully said, that the Doric pillar represents an adult male ; the Ionic, a matronly female ; and the Corinthian, a youthful virgin ; and in the robustness of the first, the graceful dignity of the second, and the delicate beauty of the third, the imagination may please itself in tracing an analogy which the founders of these distinctions had never conceived. In alluding to the distinctive ornaments of the capitals, an elegant writer thus

expresses the ideas generally entertained of their origin. "Some drops of rain, distilled from the ends of the rafters that projected over an architrave, so pleased one architect, that he added them as permanent ornaments to his Doric triglyph; a few rams' horns, suspended from the top of a pillar, so struck the imagination of another, that he formed out of them the new combination, since called the Ionic capital, but which, in ancient buildings, is often united to the Doric entablature; and a wild acanthus, accidentally lodged on the top of an ancient sepulchral cippus, and with its foliage embracing a basket placed on the pillar, and compelled to curl down by the tile that covered the basket, so charmed a third, (Callimachus of Corinth,) that, without altering essentially the other parts of the Ionic combination, he substituted it as a new capital."*

The following remarks by the same author, characterize, and successfully account for, some other peculiarities of the Grecian architecture. "We must remember, in the states of Greece, every citizen shared, by right, alike, both in the public debate, and in the public diversion; entered alike, by right, both the market and theatre; and, consequently, notwithstanding the smallness of these states, the numbers that flocked to those places, and were to be accommodated in them, greatly exceeded that which, in

* Hope on Architecture, p. 34. [Though several of the terms of art employed in the above quotation may be found in good dictionaries, it may yet be convenient to many readers to see the explanations of all of them at one view. *Architrave* is the lowest member of the entablature; and *entablature* is the whole assemblage of members supported by the columns; the architrave, therefore, rests immediately on the columns. *Triglyph* is the bundle of channels or flutings in the frieze, or central portion of the Doric entablature. The little ornaments under the triglyph are still called guttæ, or *drops*. The distinctive ornament of the Ionic capital, called the volute, curls spirally like a *ram's horn*. *Acanthus*, from a Greek word meaning a thorn, is a plant with long, deeply indented, and spinous leaves, which are imitated in the foliage of the Corinthian capital. The story alluded to, is, that a woman had left a basket, covered with a tile, on a stone or pillar, by the side of which an acanthus was growing, which beautifully shrouded the basket, and meeting with the tile, curled its leaves gracefully downwards. Callimachus was struck with this combination, on seeing it accidentally, and adopted it as the capital of a new order of architecture. *Cippus* is a small, low pillar, serving either as a grave-stone, or to mark the limits of a larger sepulchre, or place of burial.—Am. Ed.]

our larger states, need to be admitted into similar edifices. As in these, one half could not, as in the temple, be detained outside, while the other was admitted within, these buildings or places, necessarily made of immense capacity, were as necessarily left uncovered.

"Still, in a country where natural organization, acquired habits, religion, polity, and every other accessory, led to the fullest developement of the imitative arts,—to all that sculpture or painting could exhibit of the most fascinating combinations,—public edifices, whether destined for religious or other purposes, for business or pleasure; whether temples or porticoes, theatres or stadia, were decorated, even in the exposed parts, with profusion the more unbounded, because the clear atmosphere exhibited the full beauty, and the mild temperature insured the complete preservation of works of art."

It is remarkable, that the private habitations of the Grecians were, externally at least, as plain and unostentatious, as their public edifices were magnificent and tasteful. This has been justly attributed to the democratic organization of their government. The people were peculiarly sensitive and jealous, with respect to every thing which might appear to be a display of personal preeminence. While the place of worship or debate, therefore, which was the property of all, exhibited, on every side, the utmost perfection of elegance and grandeur, the private building only showed a mere blank surface; and, "like a temple inverted, possessed not external columns surrounding a solid body, but enclosed its pillars within its exterior walls."

"But that very circumstance," adds the author quoted above, "produced greater magnificence of public edifices. The citizen, unable to give vent to his pride, in his private habitation, only sought the more to gratify it, in the constructions destined to purposes of public magnificence or utility. These latter remained less confounded with,—soared the more over the former. They attained, in greater number, that size of parts, that splendor of decoration, that has made them the wonder of all succeeding ages. Thus it was that, at Athens, the Temple of Jupiter Olympius was adorned externally with two rows of columns

of Pentelic marble, of the Corinthian order; consequently of the utmost height, in proportion to their diameter, which, at their base, exceeded six feet and a half."*

The period between Pericles and Alexander seems to have been the most flourishing era of Greek architecture. That people never departed from the style which originated with them, and which hence received the distinctive name of Grecian. It presented, through all its stages, a strict conformity to the essential elements of the wooden hut which formed its earliest model. It is curious to observe to what extent the correct and elegant taste of this remarkable nation has influenced the architecture of subsequent ages. An inferior mind may perceive and imitate the beautiful; it requires native genius to invent and embody it.

ELEVENTH WEEK—SUNDAY.†

[ALL EARTHLY THINGS ARE INCONSTANT AND TRANSITORY.

As time itself is in a perpetual succession and mutation, being the companion of motion, so it fixes this ill condition unto most of those things which pass along in it; the which not only have an end, and that a short one, but even, during the shortness of time which they last, have a thousand changes; and before their ends, many ends; and before their deaths, many deaths; each particular change, which our life suffers, being the death of some estate, or part of it. For as death is the total change of life, every

* The proportion of eight diameters would cause the columns to exceed fifty-two feet.

† [The paper for this Sunday, has been introduced in its place by the Editor, and is selected from Bishop Jeremy Taylor's 'Contemplations on the State of Man,' chapter second. It recommended itself by its exceeding appropriateness to the subject discussed in this part of the volume; and, though not a fair specimen of the author's best eloquence, it is marked with the peculiarities of his superb style. It is also taken from a work of his which is not commonly known.—Am. Ed.]

change is the death of some part. Sickness is the death of health; sleeping of waking; sorrow of joy; impatience of quiet; youth of infancy; age of youth. The same condition hath the universal world, and all things in it; so that all things which follow time, and even time itself, at last must die.

All human things, as well intrinsically, and of their own nature, as by external violences which they suffer, are subject to perish. The fairest flower withers of itself, yet is oftentimes before borne away by the wind, or perishes by some storm of hail. The most exact beauties lose their lustre by age, but are often before blasted by some violent fever. The strongest and most sumptuous palaces decay with continuance, if before not ruined by fire or earthquake. Cast your eyes upon those things which men judge most worthy to endure, and made them to the end they should be eternal;—how many changes and deaths have they suffered!

Gregory of Nazianzen placed the city of Thebes, in Egypt, as the chiefest of those wonders which the old world admired. Most of the houses were of alabaster-marble, spotted with drops of gold, which made them appear most splendid and magnificent. Upon the walls were many pleasant gardens; the gates no fewer than a hundred, out of which the prince could draw forth numerous armies without noise. Pomponius Mela writes, that out of every port there issued ten thousand armed men, which, in the whole, came to be an army of a million. Yet all this huge multitude could not secure it from a small army conducted by a youth, who took and destroyed it.

But yet greater than this was the city of Nineveh, which was of three days' journey [in compass;] and it is now so many ages since, that we know not where it stood. No less stately, but perhaps better fortified, was the city of Babylon; and that which was the imperial city of the world, became a desert, a habitation of harpies, satyrs, and monsters; and the walls, which were two hundred feet in height, and fifty in breadth, could not defend it from time.

It is not much that cities have suffered so many changes, since monarchies and empires have done the same; and

so often hath the world changed her face, as she hath changed her monarch and master. He who had seen the world as it was in the time of the Assyrians, would not have known it as it was in the time of the Persians ; and he who knew it in the time of the Persians, would not have judged it for the same when the Greeks were masters ; after, in the time of the Romans, it appeared with a face not known before ; and he who knew it then, would not know it now ; and some years hence it will put on another form, being in nothing more like itself than in its perpetual changes.

How many kingdoms were overthrown by the covetousness of Cyrus ! The ambition of Alexander did not only destroy a great part of the world, but made it put on a clear other face than it had before. That which time spares, is often snatched away by the covetousness of the thief ; and how many lives are cut off by revenge, before they arrive unto old age !

There is no stability in any thing, and least in man, who is not only changeable in himself, but changes all things besides.

One day often makes an end of great riches. Many personages of great honor and esteem, changing their fortune, become infamous. Dionysius was thrust from his throne, from a king of Sicily, to be a schoolmaster in Corinth, and taught boys. Who could think, that from a king, he should be necessitated to become a schoolmaster. Who would not wonder at the cozenage of the world, that should see him in his royal palace with a sceptre in his hand, compassed about with his servants, and the great ones of his kingdom, and should after behold him in his school, managing a rod, in the midst of a number of boys ? Crœsus, the most rich king of Lydia, being in hopes to overthrow the Persians, not only lost his own kingdom, but fell into the power of his enemies, and failed a little of being burnt alive.

Particular persons are not only witnesses that all human things are dreams ; but cities, nations, and kingdoms ; nothing remains like itself ; all things present are more frail and weak than the webs of spiders, and more deceitful

than dreams. From this inconstancy of human things, we may extract a constancy for ourselves ; first, by despising things so transitory ; secondly, by a resolute hope of an end or change in our adversity and afflictions ; since nothing here below is constant, but all mutable ; and as things sometimes change from good to evil, so they may also from evil unto good.

There is no confidence to be placed in human prosperity ; for neither kingdom, empire, nor any greatness whatsoever, can secure their owners from ruin and misfortunes. Behold Andronicus clothed in purple, adored by nations, commanding the East, his temples enriched with a royal diadem, the imperial sceptre in his hands, and his very shoes studded with oriental gems ; presently after he is insulted over by the basest of his people, buffeted by women, and pelted with dirt and stones in his imperial city ; and lastly, they hung him up by the heels betwixt two pillars, and there left him to die. This is enough to make us contemn all temporal goods and human felicity, which not only passes away with time, but often changes into greater misfortunes. What esteem can that merit, which stands exposed to so much misery, which is by so much the more sensible to the sufferer, by how much it was less expected.

Who would have imagined that Valerianus the Emperor, who was mounted upon his brave courser, trapped with gold, clad in purple, crowned with the imperial diadem, adored by nations, and commanding over kingdoms, should be taken prisoner by the king of Persia, be kept enclosed in a cage like some wild beast, used as a footstool for the king to get on horseback ? But such contrary fortunes happen in human life ; let us not therefore trust in it. Crowns nor sceptres do not secure us from the inconstancy of changes ; and we may better trust unto the wind, or to letters written upon the water, than unto human felicity.

What are imperial diadems ? What are thrones and majesty ? What are ornaments of gold and silver ? All are vanity, and vanity of vanities. What were, then, the spectacles of the amphitheatre, the games of the circus,

and the seignory of the world, but vanity of vanities, universal vanity? The same would Crœsus have preached from the flames; Bajazet from his cage; and Dionysius from his school. Where is now the splendor of the Consulate? Where the lictors and their fasces? Where the crowns and tapestry? Where the banquets and revels? All those things are perished; a boisterous wind hath blown away the leaves, and left the naked trees, tottering, and almost plucked up by the roots. Where are the seven wonders of the world? Where is Nero's golden palace? Where are Diocletian's hot baths? Where is Julius's colossus, or Pompey's amphitheatre? They are all gone, there is no print of them remaining.

The things of this world are not only a shadow, but are very deceitful. They promise us goods and give us evils; promise us ease, and give us cares; promise security, and give us danger; promise us great contents, and give us great vexations. There is no felicity upon earth, no happiness which mounts on high, which is not depressed by some low calamity. It is not needful to attend the end of life to see the imposture of it. It is enough to see the alterations whilst it lasts. Be assured, that vain is all the greatness of the earth, if that of heaven be not gained by it. Since, then, all kingdoms, empires, honors, and greatness whatever, are but a shadow, and will presently vanish, and we are here in this world but as in an inn, from whence we are suddenly to depart; let us take care for our journey, and furnish ourselves with provision and a viaticum for eternity; let us clothe ourselves with such garments as we may carry along with us. This may be our comfort, that our wealth, whether we will or no, may be taken from us, but eternal happiness, unless by our fault, cannot. We may be deprived of honors against our wills, but not of our virtues, unless we consent. Temporal goods may perish, be stolen, and lost many ways, but spiritual goods can only be forsaken, and are then only lost when we leave them by our sins. The roses of glory in heaven do never fade, nor doth custom dull the lively taste of those celestial delights. I will therefore preserve myself in humility. I will not

confide in prosperity, nor presume upon my virtues, though never so great, since every man is subject to fall into those misfortunes he little thinks of. I will not trust in life, because it may fail, whilst the goods of it remain; and will as little trust in them, because they may likewise fail, whilst it continues.

Blessed Lord! thou art my salvation, thou art my glory, my aid, and all my hope is in thee: at thy right hand there are riches, greatness, and powers, for ever, without end.]

ELEVENTH WEEK—MONDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—ROME.

THE genius of the Romans became ascendant, as that of the Greeks decayed. That most wonderful people, from small and even contemptible beginnings, rose, by their extraordinary energy and military prowess, accompanied with a noble and even romantic patriotism, to be rulers of the world. When Rome arrived at the height of its power, it contained, within its single precincts, the *élite** of the population and wealth of many districts. Its private citizens, going out as governors of provinces which had once been empires, after having, in their respective governments, exercised despotic power, and reigned in regal state, returned home with all the riches of which they had stripped those whom they ruled, and lived as individuals with the income of monarchs.

Thus, there gradually arose in Rome a demand for buildings, both public and private, on a scale such as the world had never yet beheld. The conquerors not only concentrated the wealth, but the ingenuity of the subjugated nations, into the *one* imperial city, or diffused them over their limited native territory. Whatever was grand or luxurious, elegant or useful, in the vast range of their conquests, that active and inquisitive people noted and

* [Pronounced el'eet, and meaning the flower or select portion.—AM. ED.]

transferred to Italy, and there reproduced them on a scale of magnificence which far surpassed the originals. Aqueducts, bridges, forums, basilicas, temples, baths, theatres, amphitheatres, stadia, hippodromes, and naumachia, rendered the capital of the world the aggregate of all that was wonderful and useful throughout the whole extent of her mighty empire.*

"It were an endless task," says Mr. Hope, "to recite the constructions, so well adapted to every useful purpose, and every object of magnificence, reared within, or in the immediate vicinity of Rome,—aqueducts of prodigious length, which, from the adjacent mountains, carried in every direction streams of the clearest water across its vast plain into its inmost bosom; sewers of indestructible solidity, which again carried away every species of impurity; roads, as indestructible as ours are perishable, which, from the capital, diverged on every side to the utmost confines of the peninsula; and on these roads, bridges massy and durable, which joined the opposite banks of the widest rivers; forums or public porticoes, where its population might meet and converse sheltered from heat and rain, increased in the time of Augustus to the number of forty-five, and which, under Trajan, received the addition of that forum in which stood his triumphal column, surrounded by a forest of other pillars of granite of a single block of immense height and diameter; baths erected by Augustus, by Nero, by Titus, by Caracalla, and by Diocletian, each containing all that could serve for cleanliness, for health, for exercise, and for amusement, each seeming a palace in splendor, and a city in

* [The uses of *forums* and *basilicas* are explained in the succeeding extract from Hope. *Amphitheatres* were circular enclosures, with stone seats all around, rising above one another, for the exhibition of games and combats. *Stadia* were race-courses. *Hippodromes* were also courses for horse and chariot races. *Naumachia* were excavations or docks, into which water was admitted, for the exhibition of mock sea-fights. Some of these immense structures are memorials of the ferocity, as well as the magnificence, of ancient Rome and the ancient world. God be thanked that the amphitheatres, whose floors have drunk up so much blood, of persecuted martyrs, and infuriated gladiators and beasts, are now in ruins, telling silently of times which are past, and, as we trust, are to return no more.—Am. Ed.]

size, and still by their ruins astonishing the world; basilicas for the administration of justice and the despatch of business, vast and superb beyond description; and even shambles so sumptuous, that, on a medal of Nero, appears a building inscribed 'Macellum Augusti,' [Shambles, or market of Augustus,] which, from the richness of its columns, might be mistaken for an amphitheatre; the Circus Maximus, [Greatest Circus,] for races, whose incredible size and magnificence prevented not several others, little inferior to it, from successively arising; the amphitheatre of Vespasian, computed to contain 109,000 spectators, of which, after one half had been pulled down in 1084, by the Norman Guiscard, lest it should be used as a citadel against him, and the other half had furnished the Popes with materials with which to build the palaces of Farnese, of St. Mark, and of the Cancellaria, the remains have struck with amazement the beholders of every successive age; the mausolea [tombs] of Augustus, of Adrian, and others; the gorgeous palaces of the emperors; the temples without number; the triumphal arches; the architraves, piers, cornices, acroteria,* of the richest granite, porphyries, and marble, such as to bewilder the imagination that pictures to itself the buildings to which they belonged, rising spontaneously, like plants wherever in a fruitful soil we thrust a spade. Not less remarkable were the buildings, erected in every province far and near. Amphitheatres at Verona, in Cisalpine Gaul, at Arles, and Nismes, and Vienne, beyond the Alps, and at Pola, on the Dalmatian shore, almost as stupendous as the Coliseum itself: Asia Minor, adorned by Augustus with several temples of the largest dimensions; Athens itself, endowed by Adrian with a temple of Jupiter Olympius, behind which the loftiest monument of the times of her independence—that consecrated by Pericles to Minerva—hid its diminished head; Antioch, doubled from what it was under its kings; and Alexandria, made, in the column which is called of Pompey, to forget the lesser prodigality of its Ptolemies; a temple of the sun at

* [Acroteria are the small pedestals placed on the angles of pediments, to support statues, &c.—Am. Ed.]

Balbec, of which the mere base contained three stones, measuring from back to front, exclusive of the bold and rich cornice, ten feet five inches, from top to bottom thirteen feet, and collectively, from end to end, a hundred and ninety-nine feet; buildings equally astonishing, raised in the Decapolis of Palestine, and in the cities on the coast of Africa, and others, not less splendid, erected in different parts of Spain; the bridge on the Danube, and the Pont-du-gard in Gaul; the prodigious moles of different seaports; the gates of Arles, Nismes, Narbonne, Autun, and other cities innumerable; and even in a place scarce noticed in history, at Orange, one of the largest theatres known, and traces of an amphitheatre, and stadium, and naumachia, so stupendous that we can only account for its construction in that situation, by supposing that the spot was one where the whole population of the surrounding provinces met periodically for purposes of festivity."*

This splendid sketch contains, after all, but a faint view of the magnificence and extent of Roman architecture, on which, however, though the subject is tempting, I must not further dilate. But there are peculiarities which distinguished both the style of architecture of this era, and the purposes to which it was directed, from those of preceding ages, which require a short notice.

In the style, the radical difference in principle was the introduction of the arch, which, as I have already observed, if not wholly unknown, was at least but little employed, by more ancient nations. I have previously alluded to the restricted span of architecture in stone, when debarred of the use of the arch; and it will not be difficult to understand the vast new resources and powers derived from that discovery. Pillars and walls placed so far asunder, that no blocks of stone or beams of wood can connect them, may, by the arch, be embraced and combined. An area so spacious, that no flat ceiling could cover it, may, by the vault, be closed in with equal solidity and durability. By means of the vault the expense of cutting, of carrying, of raising masses of immense

* Hope on 'Architecture,' pp. 56—59.

height, only to produce small intervening spaces, may be avoided. A less quantity of materials, too, may be spread over, and render habitable, a much greater space.

The addition of the arch gave the Romans power not only to increase the extent, but to add to the grace and variety of their architecture. That people, excelling in almost every other accomplishment, appear to have been deficient in creative genius, and discriminating taste. With them the art of producing beauty was called into requisition by ostentation and luxury. Guided in their architectural imitation more by fashion than by a deeper and more intelligent motive, they only desired the semblance of Grecian forms, not the substance of Grecian principle. Skill in mechanics is a faculty wholly distinct from taste in the fine arts. Where the latter exists not, or lies dormant, or retrogrades, the other may even advance, and make great and rapid strides. The greater exigences of the Romans, in respect to architecture, the vaster buildings they had to raise and to cover, soon made them seek all the superior means of construction, and develope all the powers of the arch; while both the stimulus and the genius were wanting to aim at the nobler architectural achievements.

This universal adaptation of a more varied developement, gave to Roman architecture, from the first, an internal principle of construction, and an external corresponding feature, which had not been previously contemplated, and caused a departure from the elementary model of the Greek, in its essence really more important and more fundamental, than that which the style, since called Gothic, exhibited, in its departure from the style of the Romans.

Of the purposes to which the magnificent and expensive architecture of Rome was directed, the most peculiar was that of the erection of private places of residence. In the mighty and tyrannical monarchies of Egypt and of the East, power, riches, and ambition centred either in one autocrat or in a corporation of priests; and, therefore, in these extensive regions we find the remains only of temples, of royal palaces, of public edifices for plea-

sure, or for business, or of receptacles for the dead. In the republics of Greece, even this number was restricted; but wealthy and magnificent Rome possessed them all, in their utmost splendor, and added to the list an immense variety of private residences, which, for extent of building and extensive ornaments and luxuries, outvied all that Eastern power had executed, or Eastern fancy had conceived, for the abode of monarchs. If the Romans imitated the style of Grecian architecture, they prided themselves in departing from the simplicity of Grecian manners, and they looked with contempt on the humble habitations which displayed the influence of that democratic form of government, by which that ancient people were distinguished.

ELEVENTH WEEK—TUESDAY.

ARCHITECTURE.—ITS ANCIENT HISTORY AND PRACTICE—THE GOTHIC STYLE.

THE peculiar state of Europe, after the fall of the Roman empire, gave little encouragement to the arts, and architecture suffered in the general decline; but as the civil and military power of the Romans gave way, another power arose on its ruins, peculiar in its features, but not less efficient for all the purposes of dominion,—I mean the power of the Church. Here the authority was exerted over the mind rather than the body. It was not military but mental coercion, which gave to the head of the Roman hierarchy such tremendous strength, and made Papal Rome the arbitress of the European world, as Imperial Rome had been before. Among the clergy resided all the learning and much of the civil policy of the ages we are now contemplating; but what rendered their sway far more formidable, was, the spiritual weapon which they wielded. They possessed, in public estimation, the keys of heaven and of hell, and they had sufficient art to render this assumed property amply available for the consolidation of their power.

This state of society naturally gave a remarkable prominence to ecclesiastical architecture. The pompous ritual of the Latin Church required, or at least favored, peculiar forms in their cathedrals and abbeys, while the genius of that degenerate species of Christian worship, as well as the policy of its priests, demanded grand and imposing edifices, to impress the minds of men with ideas of greatness and of dignity, as connected with whatever belonged to their sacred profession. Thus, after thousands of years had passed away, the same spirit which gave rise to the imperishable temples of Egypt still remained in the world, and having been transmitted from age to age in all changes of society, and all alterations of creed, at last strangely infusing itself into the religion of Him who was "meek and lowly of heart," directed its priesthood to pursue similar measures for the aggrandizement of their order.*

The progress of architecture in religious structures, under the influence of Christianity, has been traced, with much ingenuity and research, from the *basilicæ* or courts of justice of ancient Rome, (converted in the days of Constantine into churches,) through its various changes during the Lombard ascendancy, till it merged, by some unknown steps, in what has acquired the name of the Gothic or pointed style. This consummation took place about the end of the eleventh, or beginning of the twelfth century. Hitherto the arch had been almost uniformly semicircular, as being the form of greatest durability;

* [In so partial and exclusive a view of this subject, we cannot possibly join. We cannot believe that the noble order of ecclesiastical architecture called, or miscalled, the Gothic, took its rise wholly in ecclesiastical ambition. We cannot believe that those noble cathedrals, and quiet parish-churches, were erected, from foundation to pinnacle, by spiritual pride and love of domination. We believe that a better spirit was at work in laying those stones, and pointing those arches—a spirit as little alloyed with evil, perhaps, as was the spirit which afterwards defaced them. We cannot see how a person of any feeling can enter one of those structures, without being convinced that a desire was present at the planning of them, of glorifying God by rearing glorious temples to his worship; and without joining in the exclamation of the poet Wordsworth,

"They dreamt not of a perishable home
Who thus could build!"—Am. Ed.]

but at this period a new principle was introduced, which, with a view to loftiness, combined with extensive space and lightness, elongated the arch by means of two segments of a large circle meeting in a central point. What was thus lost in equality of pressure was compensated for by various resources of the art, and, among others, by what are denominated flying buttresses, which afforded countervailing inward pressure, while they were consistent with the general design of bestowing a character of majesty on the whole fabric, by reducing it to somewhat of a pyramidal form.

The power of the arch was now called forth in its utmost perfection, and the various combinations which its new form required, constituted the triumph of architectural skill. What served to modify these combinations was, that the cross, the instrument of man's redemption, which had been early adopted as the chief emblem of the Christian faith, and the very form of which, in an ignorant and superstitious age, was supposed to be a charm against evil, and a token for good, was employed in the sacred architecture of the age, not merely to ornament the exterior of their buildings, and give sacredness to the altar, but even to regulate the principle on which their ecclesiastical structures were erected. This distinctive form inferred a space where the transverse limbs of the cross should unite in a large quadrangle, and this quadrangle gave rise to lofty arches springing from massy pillars, which were abutted in the various directions of the lateral pressure, by the solid walls that enclosed the area of the cruciform building. On this arched transept stood the high tower, which gave characteristic dignity to the whole.

The history of this remarkable form of structure, its sudden rise, its universal adoption, and, after a few centuries, its equally rapid decline, forms a striking feature in the progress of the arts. It may be accounted for, chiefly, from the intercommunity which existed, over the whole bounds of the Latin Church, among ecclesiastics, and the facility with which they imparted to each other the ideas which prevailed in influential quarters. The

Gothic style, first adopted, as it would appear, in the vast empire of Germany, where the arts were at that period most successfully cultivated, was recommended by various considerations, which could not fail to weigh on the minds of the great corporation which then swayed public opinion. It was admirably adapted to the prevailing form of worship, its vast assemblies, its solemn processions, its splendid and imposing ceremonies. It awed by the magnificence of its conception, and the power and science required in its execution. It formed an enduring memorial both of the skill and the resources of those under whose auspices it flourished. Besides all this, it was consistent with the principle which the Church of Rome affected, that all the nations under its dominion should display a uniformity, not merely in their ritual, but in the very character and taste of their edifices. This passion for uniformity was increased by the intercourse established by means of the Crusades ; and doubtless some of the grand conceptions which the view of conquered Constantinople, and the once mighty cities of Palestine, inspired, were embodied in this new and favorite architecture.

From Germany, the taste for Gothic architecture quickly spread into France and Italy ; and, by means of the powerful fraternity of free-masons, who, if not the originators of this style, enthusiastically adopted it, was soon diffused over the whole boundaries of the Latin Church. This remarkable corporation, which was invested by the Popes with very important exclusive privileges, spread themselves throughout Europe, carrying with them at once the science and the authority that enabled them, in those dark ages, to form works of so much magnificence ; and being aided, wherever they went, both by the countenance of the clergy, and by the wealth which a mistaken piety placed at their disposal, they supplied the demand which the zeal of the times had excited.

It is remarkable, that of the original designs for these mighty monuments of art, very few traces have been left, probably because the jealousy of the free-masons concealed them from the public eye. Some, however,

have been recently discovered among the archives of German monasteries, which show the deep science, the long forethought, and the complicated calculations employed in their formation.

ELEVENTH WEEK—WEDNESDAY.

ARCHITECTURE.—ITS MODERN HISTORY AND PRACTICE—BRITAIN.

THE decline of the pointed style of architecture, at one time so universal throughout Europe, was owing to a change of taste in the influential quarter of Italy, where the antique style of the classic ages again suddenly came into fashion. It was then, for the first time, that the pointed style received the name of Gothic. This was a title of contempt given to it by the Italians, and adopted by other nations. In the fifteenth century, learning and the arts, which had been chiefly confined, as I have said, to ecclesiastics, began to revive, and the new impulse was accompanied with an excusable reverence for the school of the ancients, which quickly spread to their edifices.

From this time the architectural taste of Europe experienced a rapid change, commencing in the seat of the ecclesiastical government, and spreading, by degrees, to the utmost extent of the Roman Church. Early in the fifteenth century, Filippo Brunelleschi, a Florentine, born in 1377, whose ardent and liberal mind led him to form his taste by studying the remains of ancient buildings at Rome, undertook and completed the cathedral of Florence, with an octagonal cupola of great dimensions, which a convocation of the architects of that age had pronounced impracticable. The completion of this edifice, the example of the other excellent works in which he was employed, and the perusal of the writings of Vitruvius, created a general disposition to this style of architecture. It was increased by a treatise of Alberti, a learned canon of the metropolitan church of Florence,

who, like many other monks of the preceding ages, also practised architecture. These circumstances were preparatory to the great undertaking which fixed the epoch of the revival of this art, and gave to the Christian world a temple, which, in magnitude and variety of parts, far surpassed every Grecian and Roman work of a similar description. In the pontificate of Julius II., Bramante, a native of the duchy of Urbino, having been distinguished by various architectural works at Rome, was employed, first to design the great theatre between the Old Vatican and Belvidere, and afterwards the original plan for St. Peter's church; and the latter magnificent structure, altered, however, and in some respects deteriorated, was carried on under the direction of Raphael de Urbino, the friend of the designer. Various other eminent men flourished at the same time, who adopted similar views, and, by their labor, contributed to establish the taste which had thus been introduced. Among these was Michael Angelo, eminent alike in the three kindred arts of painting, sculpture, and architecture, who, with mighty genius, was deficient in taste, and in the pursuit of novelty often lost sight of propriety; but who has, notwithstanding, left behind him a name which succeeding ages have not eclipsed.

It is no part of my design to enter into a minute description of modern buildings. In referring, however, to the progress of the art in Britain, it would be culpable neglect to omit the name of Inigo Jones, who flourished at the beginning of the seventeenth century, and who was the first English architect that, having cultivated the Grecian style, established it in his native island. Of him it is remarked, that besides the classical elegance which he introduced into public buildings, we are indebted for much of the convenience and comfort, then, for the first time, introduced into private buildings.

The only other British architect whom I shall name, as giving permanence to the modern style of architecture, is Sir Christopher Wren. This eminent man came into notice about the middle of the same century. It is to him that London is indebted for the plan and rebuilding of the present cathedral of St. Paul's, after the former

structure had been consumed in the great fire of 1666. It is proper to observe, however, that, great as this effort of architectural art undoubtedly is, it does not equal, either in simplicity, elevation, or boldness, that which he originally conceived, and was desirous to execute. The commissioners interfered with and checked his magnificent views, and he was under the necessity of cramping his genius, from the want of liberality in his employers. In the church of St. Stephens, Walbrook, there is an admirable specimen of his skill. It consists, internally, of a cupola, resting on Corinthian columns, the whole distributed and adjusted with the utmost elegance and correctness. Besides many other works which the devastation of the fire subjected to his genius, in the Monument erected to commemorate that calamity, he constructed a column, equal in design and execution, and superior in elevation, to any of antiquity. The height of this column is 202 feet; that of Antoninus, at Rome, was 175; and that of Trajan only 147.*

I need say little of the present state of architecture in England, as relates either to public or private structures. The principles of the art seem to have been long fully developed; and the application is as various as the varied taste, rank, and resources of the individuals who require its aid, or of the architects, whose taste and skill are employed in furnishing plans for its execution. The increasing intelligence and refinement of the age, with which the prosperity of the country has kept pace, have given rise to edifices of all descriptions, magnificent or elegant, commodious or useful. The taste for beauty, convenience, and comfort, is obviously on the increase. In their private residences, the houses of English gentlemen and merchants are fast advancing to a rivalship with the villas and castles of the nobility, and these again with the palaces of princes. Nor are the dwellings of persons in the less wealthy ranks in a stationary state. Every year brings additional accommodations to the farmer and his dependants, while the houses in the towns are becoming more commodious and elegant, the shops more

* Edinburgh Encyclopedia, article 'Civil Architecture.'

rich and tasteful, the warehouses more numerous, extensive, and convenient. With regard to manufacturing buildings, as they have rapidly increased in perfection and extent of machinery, they have made equal progress in accommodation and in magnificence. The establishments of this kind, in Lancashire and other counties, overwhelm the mind with astonishment, and exhibit views of wealth and facilities to industry, which, previous to experience, we might be inclined to think could only be found in the fancies of an Eastern tale.

Of all European countries, in Britain, especially, are strongly marked the happy changes consequent on the progress of society in arts and civilization; and none of these changes are more striking than what belongs to the practice of architecture. Other nations studiously display their means of warlike defence. Every town is fortified,—the bridges are built with a view to military defence,—the rocks and rising grounds bristle with towns and battlements. It is not so in Britain. Its insular situation and command of the sea, secure it against foreign invasion. A contented population is its defence against internal commotion. Except a few ruined towers, the relics of a more barbarous age, and here and there a dismantled castle, every thing breathes peace and prosperity. Look down from some elevated situation on the surrounding country, and what do you behold ?—the noble mansion, rising in the midst of a wide-spread lawn and stately woods; the neat farm-house, with its quadrangle of commodious offices, its threshing-mill, and its well filled stack-yard; the clean and healthy village, with its smoke rising from every chimney, to indicate domestic comfort within, and its hedge-enclosed gardens, where flowers, mingling with useful vegetables, pleasingly indicate the same prosperous condition; perhaps, in the distance, some tall chimney pours forth its volumes of dark smoke, speaking of manufacturing industry; but, above all, the church-spire, or belfry, blesses the scene, and directs the mind to higher and holier musings; while, all around, the green pasture-grounds meet the pleased eye, intersected with hedge-rows, and mingled with variously tinted fields, where

agriculture has been busy with its plastic hand. Such a scene as this is peculiarly characteristic of the Island, in its present state of peace and prosperity; and, when contrasted with the appearance of the country but a few centuries back, singularly displays the hand of a benignant Providence, urging forward and directing the labors of industrious man.

ELEVENTH WEEK—THURSDAY.

ARCHITECTURE.—ITS MODERN HISTORY AND PRACTICE—BRIDGES.

THE invention of the arch, besides making a most essential difference in the art of house-building, gave peculiar facility to another important improvement, which the intercourse of society required,—the means of conveyance across rivers and deep ravines. The Romans, to whom we have traced the first free use of the arch for the former of these purposes, seem to have been also among the first who applied it in the construction of the latter. Of these ancient works, one of the most remarkable which still remains, and, indeed, of which we have any account, is the bridge of Alcantara, in Spain. It is constructed over the Tagus, and consists of six arches, of about a hundred and twelve Spanish feet each, the height, from the bottom of the river to the road-way, being two hundred and five feet.

At the close of the dark ages, the revival of bridge-building in Europe was greatly aided by the enthusiasm and reveries of a poor shepherd, in the neighborhood of Avignon, in France. A religious fraternity had previously been formed, under the title of 'Brothers of the Bridge,' whose duty it was to facilitate, by every means, the passage of rivers. The person of whom we speak, did not originally belong to that brotherhood; but, while following his duties as a shepherd boy, before he was twelve years of age, is said to have received repeated

revelations, commanding him to quit his flock, and undertake the building of a bridge at Avignon. Whatever might be the nature of the impulse he received, the enthusiastic youth obeyed it, and arrived at Avignon just at the time when the bishop was preaching, to fortify the superstitious minds of the people against an eclipse of the sun, which was to happen the same day. In the church, the young adventurer raised his voice, proclaiming that he was come commissioned to build a bridge over the Rhone. The proposal, falling in with the views and wants of the people, was received with applause; and, notwithstanding the contemptuous opposition of the magistrates and men in power, was carried into effect by the contributions of the inhabitants and the zeal of the clergy, aided by the performance of many pretended miracles. This bridge, which was composed of eighteen arches, was begun in 1176, and completed in 1188. Part of it has resisted the ravages of time and the destruction of war, and remains, to this day, a monument of religious fanaticism, applied to a most useful purpose, and developing scientific skill. The extraordinary individual who animated and superintended the work, was afterwards known in the Romish calendar by the name of Saint Benezet. In the year 1454, a bridge was built in the same country, at Vielle-Brionde, over the river Allie, the span of which was a hundred and eighty-three English feet,—the greatest effort of architectural skill that has yet been exemplified in an arch of stone. At Schaffhausen, however, in Switzerland, a wooden bridge was erected in 1758, the length of which was no less than three hundred and sixty-four feet, without any support but that of the abutments on the banks of the river; and what added to the wonder was, that, for some reason which is not mentioned, if not accidentally, the bridge was made to bend eight feet out of the straight line.

In Britain, a new era has, in our own age, been introduced into the art of bridge-building, by the use of iron. The first cast-iron bridge was erected over the river Severn, near Coalbrook Dale, in 1777, the span of which is upwards of a hundred feet. Subsequently, another, of a

hundred and thirty feet span, was thrown over the same river; and, in 1796, a bridge of similar materials was built across the river Wear, at Sunderland, the extent of which was two hundred and thirty-six feet.

The bold and rapid progress of this new species of bridge-building, indicated a power that was not destined to be confined within such narrow limits. Mr. Telford* gave in a plan to a committee of the House of Commons, for rebuilding London Bridge, by which he proposed to throw a bridge of one arch across the Thames, the span of which was to be six hundred feet, and the versed sine, or height of the arch, sixty-five feet. This plan met the approbation of the Committee, and was by them submitted to the investigation of twenty persons, most eminent in Britain for scientific knowledge or practical skill. Their reports justified its adoption, but a rapid succession of political events interfered with its execution.

The most remarkable exertion of skill in bridge-building, however, which has actually been reduced to practice, is that of the magnificent iron-bridge over the Menai, of which Mr. Telford was at once the projector and executor. The island of Anglesey is divided from Caernarvonshire, by the celebrated strait, or arm of the sea, named the Menai, through which the tide flows with great rapidity, and, from local circumstances, in a very peculiar manner. This rendered the ferry difficult and hazardous, and it had long been a matter of speculation, how this important line of communication with Ireland, by the port of Holyhead, could be improved. Wooden bridges, and embankments with draw-bridges, had been alternately proposed and abandoned. Mr. Rennie, the celebrated civil engineer, had given in a report to the House of Commons, in 1810, in which he projected two plans,—one to pass over the Swilley Rocks, by a cast-iron bridge of three arches, each of three hundred and fifty feet in span; and the other to unite the mainland with the island, at the narrowest point, by a single arch,

* Mr. Telford was a native of Dumfriesshire, who, by his genius, raised himself from the station of a common mason, to that of one of the most celebrated engineers of the age.

of a span of four hundred and fifty feet. The latter plan, however, he declared to be, if not impracticable, at least "too hazardous to be recommended," because of the difficulty and risk in constructing a centre of such vast extent, "without any convenient means of supporting it in the middle, on account of the depth of water, and rapidity of the tide." But Mr. Telford, having been afterwards employed, had sufficient ingenuity to obviate this difficulty, in the adoption of a new mode of centering by suspension, instead of support from below. This plan was carried into successful execution, and has introduced a principle of the utmost utility, the limits of which it is not easy to estimate. By constructing a bridge on this principle, of five hundred feet span, and raising it in the centre to the height of a hundred feet above the surface of the tide at high water, he has accomplished a work, which, while it completely answers the purpose of road communication, leaves the navigation unimpeded, giving free passage to vessels of a hundred and fifty tons burden, with "all on end," and of three hundred tons burden, with their top-gallant-masts struck.

Into the details of this remarkable work I shall not be expected to enter; but the principle may be stated in a few words. The power of suspension is obtained by raising, at each abutment, buildings of masonry, to an adequate height, over which iron chains are made to pass, which are secured on the land side by being inserted into the solid rock. The mode of constructing the centre, or frame-work, was the principal achievement in this bold and ingenious plan. Of this operation, Mr. Telford himself says, "it is applicable to stone as well as iron arches;" and he adds, that the original idea "is perfectly simple, and the effects of all its operations are more capable of correct demonstration, than those of the former mode of supporting from below." The successful execution of it, on so large a scale as at Menai, has, as he anticipated, removed all difficulties with regard to carrying bridges over inaccessible ravines, or turbulent streams; and a new era has been formed in bridge-building.

The beauty of this splendid work is not less distin-

guished than its conception was sublime. It is impossible to view, without a very high degree of admiration, a fabric erected in the air by human skill, emulating the rainbow in the extent of its span, and appearing, at a distance, almost as delicate as the gossamer's web, while its elegant proportions, and its magnificent sweep, embody every preconceived idea of what is graceful in outline. Nor will the sentiment fail to be rendered still more intense, when it is known, that the strength and durability of the fabric are as remarkable as its appearance is airy; that a tenfold security is given to its permanence, by a combination of all the resources of science; and that difficulties, which, in any earlier period of the art, must have been considered absolutely insurmountable, have been overcome with ease and certainty. But the contemplative mind will not stop here. A principle has been successfully employed, which unfolds new and more extensive triumphs for science, in its application to schemes of practical utility; and it may be, that a few years shall not pass away, till we shall have discovered, that what has yet been executed, is but as child's play to the works which then shall be achieved. If only the activity and enterprise, which at present distinguish the age, are destined to continue uninterrupted, there is no hazard in this anticipation.

ELEVENTH WEEK—FRIDAY.

ARCHITECTURE.—ITS MODERN HISTORY AND PRACTICE—AQUEDUCTS.

One of the remarkable effects of commerce and manufactures is to give rise to works of art, by which easy communication may be extended, in various inland ramifications. The carriage of heavy goods, by roads, is tedious and expensive; and wherever good water conveyance can be obtained, this has many advantages. The first improvement of this kind of conveyance, has

probably been that of operating upon streams, to render them navigable ; though, in Egypt, from its peculiar situation, and the circumstance of the periodical inundation of its great river, canals, both for the conveyance of goods, and for the distribution of the water on the higher grounds for the purposes of irrigation, were adopted at a very early date.

In England, the progress of the art of inland navigation is very distinctly marked. It was not till the middle of the last century, that it had proceeded further than the mere straightening, embanking, and deepening of rivers. But experience had shown, that navigations of this sort were liable to perpetual deterioration. The rivers, which were thus subjected to the control of art, were found speedily to change the form of their beds. Gravel and sand were swept away by the rapids at the wiers, and deposited in banks and shoals in the ponds below. During floods, the works were overtopped by water, and frequently injured ; and the crooked navigation, with the trackage against the stream, was at all times laborious and dilatory. These difficulties suggested the propriety of leaving the natural bed of the river, and led to the formation of a separate cut, with pond-locks. The first work of this kind, was the Sankey Canal, in Lancashire, which was quickly followed by a far more bold and extensive enterprise, by the Duke of Bridgewater, in the same county. This spirited nobleman, having found in Mr. Brindley an engineer worthy of his grand projects, crossed streams, embanked valleys, and bored through mountains ; and thus completed a work which was at first pronounced impracticable, but the success of which, notwithstanding so many natural obstacles, gave a wonderful impulse to the system. A generation had not passed away, after this important operation was completed, till between two and three thousand miles of canal navigation had been constructed in England alone ; in the construction of which, all kinds of difficulties had been experienced, and had been overcome by the talents and perseverance of an ingenious and industrious nation.

[The construction of canals in the United States, has been carried on of late years with energy and success.

At the head of these artificial rivers, stands the Grand Canal in the State of New York, connecting Lake Erie at Buffalo with the Hudson river at Albany. Its length is three hundred and sixty-three miles; with six hundred and eighty feet of lockage. It is consequently about four times as long as the longest canal in England. It is forty feet wide at top, twenty-eight at bottom, and four feet deep. Its aggregate rise and fall is six hundred and fifty-four feet, effected by eighty-one locks. This great work was begun in 1817, and was finished in 1825; costing the State about five millions of dollars. AM. ED.]

Under the present head, my main object is to notice the architectural skill, which this branch of improvement has called forth; and I shall therefore confine myself to the notice of *aqueducts*, which, in some situations, form the most difficult part of the art, as connected with the construction of canals. When the course of a canal crosses that of a river, it becomes necessary to build a bridge, and, upon it, in place of a common road, to form a channel and towing-path for the canal; the height of the aqueduct being regulated by the relative levels of the river and canal, and its breadth by that of the canal. Most works of this kind differ little from that of a road-bridge of similar dimensions. But, about the year 1795, Mr. Telford, having been intrusted with the management of the Shrewsbury and Ellesmere Canals, had his attention drawn to the construction of some large aqueducts; and having observed, in several instances, the masonry of aqueducts, where puddle was employed, to be cracked, and very subject to leakage, was led, by these circumstances, to employ cast-iron work in forming the bed of the canal. This he did, in the first instance, upon the Ellesmere Canal, at Crick, where the aqueduct was six hundred feet long, and sixty-five feet high above the river. Here he rejected the method of puddling; built the spandrels over the arches, with longitudinal walls only;* and across these walls laid flaunched plates of

* [*Puddle* is a well-tempered mixture of clay, worked by the hands, for the purpose of excluding water. *Spandrels* are the spaces between the outside curve of an arch and the line which surmounts it.—AM. ED.]

cast-iron, as a bottom to the canal, and the means of binding the walls horizontally. These were well jointed, screwed, and caulked; while the sides of the water-channel were built of stone facings, and brick hearting, or back, laid in water-lime mortar. By this mode, the quantity of masonry was much reduced, and the purpose, at the same time, effectually secured.

On the same canal, it was found necessary to cross the river Dee, at the bottom of the fine valley of Llangollen, at Pontcysylte, at the height of nearly a hundred and thirty feet above the surface of the river, and for a thousand feet in length. In this stupendous work, Mr. Telford introduced a still more decided deviation from the usual form, by building upright piers only, and, instead of arches of masonry, placing cast-iron ribs between them, constructing the canal part by cast-iron flaunched plates, for the sides as well as the bottom; and, in order to preserve as much as possible of water-way, projecting the towing path over the water in the canal. The canal part is twelve feet in width, which admits boats of seven feet beam, and a towing-path. Where the embankment commences, the height is seventy-five feet, and it is carried, on both sides, to an extent amounting in all to fifteen hundred feet.

This is probably the greatest aqueduct and embankment ever made for a navigable canal. Other works of the same kind, however, have since been constructed, of great magnificence, among which I may mention the three aqueducts erected on the Edinburgh and Glasgow Union Canal, in which the modes of the two aqueducts already mentioned have been combined; that is to say, the masonry of the arches and spandrels are finished as at Crick, and cast-iron plates for the bottom and sides, as in Pontcysylte, are introduced within the masonry. An improvement is made in the piers, by forming them hollow throughout; which mode, with an equal quantity of masonry, embraces a greater extent of base, and, having more external, as well as internal, surface, insures better materials and workmanship.

It is probable, that the art of canal-making has now

arrived at its climax, being about to be superseded by an improvement of vast importance,—that of locomotive engines on railways; but the necessity of large structures for crossing rivers and ravines will not, on this account, be dispensed with, and we are perhaps destined to see works, in the progress of this new mode of conveyance, which, in magnificence of design, and skill of execution, shall prove that the art is as yet but in its infancy. The wonderful and unexpected progress which but a few years have made in the power of transit, both as regards extent and speed, has left no bounds to the imagination in looking forward to the future.

ELEVENTH WEEK—SATURDAY.

RAILROADS WITH LOCOMOTIVE ENGINES.—THE LIVERPOOL AND MANCHESTER RAILWAY.

THERE is another species of construction, of great magnitude and importance, noticed at the close of the last paper, to which the present advanced state of science and of commercial intercourse has given rise, and which, though not necessarily connected with architecture, sometimes, like the canal, of which it is the successful rival, draws largely on the resources of this art. I allude to the railroad. This, in its simplest form, is not a recent invention. Nearly two centuries have elapsed since the introduction of tram-roads,* rudely constructed of wood, which were afterwards improved by the substitution of iron. In the last quarter of a century, this mode of conveyance has rapidly increased, especially in the neighborhood of Newcastle and Sunderland, where railroads have for some time been employed by private companies for the transportation of coals to the Tyne and Wear.

The first public railway for the conveyance of general merchandise and passengers, as well as of coals, was that

* [Tram-roads, or track-ways, are a rude kind of railroad.—AM. ED.]

of Stockton and Darlington, which was opened in September, 1825. In 1822, a similar undertaking was projected, for facilitating the intercourse between Liverpool and Manchester; but it was not till after numerous delays and discouragements that it was completed.

The sagacious projectors of this latter undertaking, were, on good grounds, sanguine of success. Liverpool, as a commercial seaport, is second only to London; while Manchester is an immense manufacturing town, and the centre and focus of a populous manufacturing district; and although an incessant interchange of commodities, amounting to upwards of a thousand tons per day, and constantly increasing, subsisted between these two towns, the modes of conveyance were tedious. These encouragements to the new undertaking, induced the projectors to persevere, and they at last effected their object, at an expense of not less than eight hundred thousand pounds.

On the 15th of September, 1830, this celebrated railroad was partially opened; and, on the 4th of December following, it was, for the first time, subjected, by way of experiment, to a full load of merchandise, in eighteen wagons, the gross weight of which, independent of the engine, was about eighty tons. This enormous load, which, if drawn along the turnpike road, would have required eighty horses, employed for the period of sixteen hours, was conveyed from Liverpool to Manchester in less than three hours, by a single locomotive engine. This, however, is considerably more than the ordinary burden, and less than the usual speed. The distance, which is upwards of thirty miles, is commonly passed in about an hour and a half, being at the rate of twenty miles in the hour. But, in descending inclined planes, the speed is not less than thirty or thirty-five miles an hour.

The utility and safety of this stupendous undertaking, were thus established, and its success was secured, although it was not till some time afterwards that it was in full operation. By the end of the year 1830, that is, in three months and a half, notwithstanding the imperfect state of the preparations, upwards of 70,000 passengers

had been conveyed along the line to various distances. Since that time, the amount of traffic, and of passengers, has far exceeded the expectations of the projectors, and has been rapidly progressive. In the year 1832, the gross receipts were £155,600; and in 1836, they amounted to £234,600.

The nature of a railway is too well known to require a particular description. In the work of which I now speak, there were both peculiar facilities and difficulties. The general face of the country was sufficiently level; but there were places which had to be excavated to the depth of sixty or seventy feet in the solid rock, and others which required extensive embankments; while, in one place, a valley was to be passed by a viaduct of nine arches, each fifty feet in span, and, in their greatest height, seventy feet. A peculiar difficulty occurred in carrying the line across an extensive morass or bog, in some places between thirty and forty feet deep, and so nearly approaching to a fluid state, that an iron rod would sink through it by its own gravity. But this obstruction was also overcome by skill and perseverance.

There was yet another important operation connected with this undertaking, which was also successfully accomplished, that of gaining access to the river Mersey, by a tunnel excavated beneath the town. The length of this tunnel is two thousand two hundred and fifty yards. It is cut through various strata of red sandstone, blue shale, and clay, sometimes arched artificially, and at other times supported by the natural strength of the stone in which it is excavated. The height from the roof to the surface of the ground, varies from five to seventy feet.

I have given these details, because this spirited undertaking may be regarded as the commencement of a new era in the history of human intercourse.

A well-written pamphlet, published by the treasurer of the Liverpool and Manchester Company, in 1830, soon after the opening of the railway, to which I am indebted for most of the above information, contains the following just and interesting remarks. "Perhaps the most striking result produced by the completion of this railway, is,

the sudden and marvellous change which has been effected in our ideas of time and space. Notions, which we have received from our ancestors, and verified by our own experience, are overthrown in a day, and a new standard is erected by which to form our ideas for the future. Speed, despatch, distance, are still relative terms, but their meaning has been totally changed in a few months. What was quick is now slow; what was distant is now near; and this change in our ideas will not be limited to the environs of Liverpool and Manchester; it will pervade society at large. Our notions of expedition, though at first having reference to locomotion, will influence, more or less, the whole tenor and business of life." "A transition in our accustomed rate of travelling, from eight or ten miles an hour, to fifteen or twenty, not to mention higher speeds, gives a new character to the whole natural trade and commerce of the country. A saving of time is a saving of money. For the purposes of locomotion, about half the number of carriages will suffice, if you go twice the speed; or the aggregate travelling of the country may be doubled, or more than doubled, without any additional expense to the community. The same may be said of the number of wagons for the conveyance of merchandise. The saving of capital, therefore, in this department of business, is considerable, from expedition alone. A great deal of the inland trade of the country is conducted by the agency of travellers; and here, what a revolution in the whole system and detail of business, when the ordinary rate of travelling shall be twenty miles, instead of ten per hour! The man of business at Manchester will breakfast at home, proceed to Liverpool, by the railway, transact his business, and return to Manchester before dinner. A hard day's journey is thus converted into a morning's excursion."

The writer, proceeding to speculate on this subject, in that acute mercantile spirit for which his town is remarkable, anticipates, what is now on the point of being realized, the rapid extension of railroad communication throughout the country, and sees, in this, a new theatre of activity and employment to an industrious population.

"If we look," says he, "to the construction of only one hundred railways, equal in extent to the Liverpool and Manchester, comprising a line of three thousand miles, in various situations, and absorbing a capital of fifty or sixty millions of pounds sterling, what a source of occupation to the laboring community! What a change in the facility of giving employment to capital, and consequently in the value of money."*

These are important and well-founded results of the new system of locomotion thus happily commenced, and which will doubtless extend to every quarter of the civilized world.† But a far more important inquiry, is, that of the effect thus likely to be produced on the habits and feelings of men, in their extended intercourse. May we not hope that the period has at length arrived, when, without injuring the human character, facilities for locomotion, hitherto for wise purposes denied, are about to be united to the other gifts of Providence, which shall enable man to change his place with the ease and rapidity of the tenant of the air. This view unfolds a train of thought much too varied and vast to be at present entered on, extending to all the relations of life, bearing not merely on our mercantile condition, but on our character as social, moral, and religious beings.

* The total number of railway bills passed during the ten years ending with the session 1835-6, was a hundred and twenty-seven; the total passed in session 1836, was thirty-three. Twenty of the latter comprise, in their estimated cost, a capital of more than seven millions.

† [The mode of locomotion by railroads was introduced into the United States, soon after its adoption in the mother-country, and has been pursued with so much zeal, from the experience of its benefits, that our roads, in number and extent, will soon outstrip, with railroad speed, those of Great Britain. From the nature of the case it must be so. We have a vast and highly productive interior, and this interior must be connected with our commercial cities; while these cities, separated by great distances, must be connected with each other. Thus, too, the great interests of the country will be bound together, it is to be hoped, as with clamps of iron, and the state, which was perhaps becoming unwieldy, will be again made compact. "Thirty-six years ago," said a friend, "I was one of a party, who, with much labor and fatigue and vexation, accomplished the journey from Boston to Washington in *nine days*. I have now just returned from the same journey, which I performed in *thirty-three hours*, without any labor, fatigue, or vexation whatever." And greater things than this will be done.—Am. Ed.]

TWELFTH WEEK—SUNDAY.

AN AUTUMNAL SABBATH EVENING.

THERE is something at all seasons peculiarly pleasing in the evening hour. Day, with its round of active duties, has passed away, and the sober twilight gives a character of repose and softness to every object. The fields, no longer sparkling in the enlivening sunbeams, lie in the shade, as if eager to drink in each dewdrop that distils in the quiet air. The face of nature, in that hour, is stamped with the impress of change, and its solemnity has not unfrequently aroused the slumbering conscience, for a moment, to the remembrance of days spent in vanity, and nights consumed in folly, and awakened a thought of Him, whose still small voice is often unheard amid the turmoil of this world. But, if evening, in itself, is so lovely, and so well fitted to excite reflection, the close of the Sabbath speaks in a deeper tone to the heart of the Christian; and it may be questioned if, other things being equal, any of his hours are so emphatically seasons of enjoyment as these. To them, in the varied labors of the week, he looks forward with glad anticipation, and he welcomes their return as the smiles of a long-absent friend.

And whence this peculiar enjoyment? It is not in the softness of the evening hour, nor in the mysterious beauty of the "moving light and shade." These things are often better appreciated by the Christian, than by any other, but the secret of his peace is not in them. The mind that is already at peace, is prepared fully to enjoy scenes so much in unison with its own state; while many who have sought comfort in external nature, have been taught in the search,

> "How ill the scene that offers rest,
> And heart that cannot rest, agree."

The Sabbath evening is not, in itself, more lovely than any other. The glories of the great Creator, are manifested in every declining sun, but the mind is not always equally alive to them. It is after the solemn exercises of the day of God, that heaven seems nearest to earth. If man grows to a resemblance to that which he most contemplates, it follows that, after a day set apart more exclusively for seeking God, and raising to Him a tribute of praise, his love should be more glowing, and his heart more weaned from earth, than at the termination of one necessarily much engrossed with worldly occupation.

The Christian has been standing on the mount of ordinances, striving to catch a beam from the land of glory, and to raise a feeble note in accordance with the music of heaven. Is it wonderful that, when he descends, the parting gleam of the rich autumnal sunset should seem an earnest of that better land? and that the many-colored leaves, floating silently from the parent tree to their grassy resting-place, should excite a joyful remembrance of the promise, that the people of God shall dwell by a tree, whose unfading leaves are for the healing of the nations? He has been contemplating the attributes of that God, who fills heaven and earth with his presence; and his mind is expanded to its utmost extent, with a sense of his stupendous greatness. The felt presence of the Creator in his works, like the principle of life in the human frame, gives animation and interest to all. His voice is heard in the breeze; his footsteps are seen in the wood, and the soul longs to dwell before Him, till it bears his likeness, as faithfully as the stream reflects the imagery of the sky, with its fleecy clouds and azure depths. He has been lying at the feet of Jesus, waiting to receive the whispers of his mercy, and longing to feel, through all the recesses of his soul, the power of his unfathomable love; and the gracious Saviour owns the suppliant in the fulfilment of his parting words to his disciples, "Peace I leave with you, my peace I give unto you." The words, impressed with all the force of eternal truth, sink into his reviving

spirit, and "peace" seems written on all around him. He who has been privileged, on the Sabbath, to strive to bring some wandering souls to Christ, has experienced the happiness of committing them to Him at its close, leaving their welfare to his infinite compassion. How sweet is it to read in the course of the seasons, and the abundance that crowns them, the bounty of that Lord who sustains the tribes of earth. This is He who careth for souls, and "willeth not that any should perish, but that all should come unto Him and live."

A blessing, worthy of the liberality of the King of kings, has been annexed to the observance of the Sabbath, "Ye shall keep my Sabbaths, and reverence my sanctuary; and I will set my tabernacle among you; and I will walk among you; and I will be your God, and ye shall be my people." There is not one among the children of God, who will not testify that, "in the keeping of this commandment, there is great reward." In proportion as the Sabbath is improved, will each day resemble a Sabbath, in being employed for God, and spent in the frame of spirit which most resembles that of the blessed beings who keep a perpetual Sabbath around the throne. Let not the people of God think lightly of his day. Its early morning should witness the devotion of the thirsting soul. Its hours, as they pass in the closet, or the sanctuary, should all be full of God. There is enough in the wonders of redeeming love to fill the minds of *angels;* surely, then, more than enough to engross the best affections of those, on whose behalf that love was manifested. The longer it is thought of, the more impossible does it appear, that the heart of man can ever understand or value it, according to its exceeding price.

The beauties, that shine in the countenance of the Redeemer, shall be gazed on with unwearied transport through eternity. How gladly, then, should those seasons be welcomed, that afford the best opportunities for looking on them from afar! To him who does thus look, they are revealed faint and dim, compared with what they shall be, yet with a celestial brightness which makes all

earthly light grow pale and fade; and, as he fixes his steadfast gaze, the face of the beholder shines, and he is transformed into a nearer resemblance to Jesus, the friend whom his soul loveth. With such a friend at hand, and heaven in prospect, the fading rays of evening are full of beauty; for they point to the coming dawn of a "morning without clouds." The gradual change from the laden bough and the yellow harvest, to the leafless tree, and stripped and barren earth, are perceived, not with sadness, but with cheerful hope; for years are ever passing, and ever bringing nearer the great and final change; and, when the seed, sown by the heavenly Husbandman, shall, under the constant influences of his sun and showers, have yielded fruit to his glory, He will gather it into his garner. All the chaff that mingles with it now, shall be separated, for nothing that defileth can be admitted there. But not one grain of wheat, however small, shall be despised or lost; for each is precious in the sight of Him who sowed and ripened it. M. L. D.

TWELFTH WEEK—MONDAY.

PROSPECTIVE IMPROVEMENT OF LOCOMOTIVE POWER.—ROTARY STEAM-ENGINE—ELECTRO-MAGNETIC ENGINE.

THE practice of locomotion, by means of steam, is yet in its infancy; and in this age of invention, we need not be surprised to find men of ingenuity actively employed in attempts to discover new and more useful modes of applying this wonderful power to an object of so much importance. The chief defect of the steam-engine, in its present form, as applicable to locomotion, consists in the necessary weight and bulk both of the machinery itself, and the coals and water required for the boilers. This is a disadvantage which, though not felt in stationary engines, forms so great an impediment to the locomotive principle, that any scheme by which it could be obviated or diminished, while other proper-

ties should remain the same, could not fail to be regarded as highly important.

The weight of the requisite machinery is chiefly owing to the complicated apparatus connected with the movement of the pistons. A plan for dispensing with the pistons altogether, and thus greatly simplifying the mechanism, has lately been adopted, with apparent success, in America, by recurring to the method by which the power of steam was originally, and at a very early period, employed in the direct production of rotary motion. Should this power be found, when tried on a large scale, to answer the sanguine expectations of its advocates, a most desirable saving would be effected in the weight and complicated nature of the mechanism.*

* I allude to Avery's rotary steam-engine, which was first rendered available for moving machinery in America, and has recently been introduced into Great Britain, by Mr. Craig of Edinburgh, by whom patents have been obtained. This engine is formed on the principle discovered by Hero of Alexandria, so far back as the second century before the Christian era; but it has never, till now, been considered of sufficient power to be employed for any useful purpose. In this engine, the steam is conveyed from the boiler by a pipe, to a hollow axle, on which are fixed two oblate hollow arms, enclosed in an iron case. Through this case, the axle passes and revolves in collars or bushes of hemp, which prevent the escape of steam. On the same axle, and outside the case, is a pulley, over which is placed a belt, to communicate the power for any purpose required. The steam, on passing from the boiler, enters the hollow axle, and, by openings from it, into the two arms; at the extremity of each arm, and on opposite edges, is an aperture, through which the steam escapes into the iron case, from whence it is taken off by a pipe. The uniform pressure of the steam at the end of the arms being destroyed by the two apertures, the arms are made to revolve with a force proportioned to the area of the apertures, and the pressure of the steam in the boiler. The axle being made of cast steel, highly polished, and revolving in bushes or collars of hemp, (which are always kept moist by the steam,) there is almost no friction; and thus the whole power is given out, as described, at the end of the arms, which, being fixed on the axle, impel it with a constant, uniform, steady motion. The constructing of one of these engines, of fifteen horse power, was successfully completed by Mr. Ruthven of Edinburgh, on the 12th of September, 1837;—it has since been constantly in use in his works, and has given the greatest satisfaction. It has now (April, 1838) been upwards of seven months constantly employed, and, I am informed, without having cost, during that time, one penny a week for oil or tallow, and not a farthing for any repair; while, from its

This mode of applying steam-power, however, would scarcely affect the quantity of coals and water which must be consumed in generating it; and, indeed, so long as steam is resorted to, as the impelling agent, we can expect no great diminution in the use of these articles. But there are in Nature other agents of tremendous force, to which, could they be made subservient to the will of man, a similar objection would not apply; and it is by no means chimerical to suppose, that human ingenuity has as yet only touched on a territory where elements of power remain to be developed, capable of a far more extensive and useful application, than any hitherto employed.

In making this observation, I particularly allude to the very recent discovery of a method of applying to machinery a power generated through means of magnetism; an agent hitherto regarded more as a subject of curious experiment, than as possessing any mechanical value. Since it already seems possible, that, at no distant date, this invention may be generally adopted in many cases in which steam-power is now used, and especially for the purposes of locomotion, it may not be deemed superfluous to devote the remainder of this paper to so interesting a subject.

An artificial magnet need hardly be described. It consists of a bar of iron or steel, which, having been subjected to a certain wellknown process, acquires the property, when suspended horizontally by a single fibre of untwisted silk, or nicely balanced on a pivot, of arranging itself, after a few oscillations, in a direction nearly

simplicity, an important saving in fuel is obtained. Engines of this construction are rapidly coming into use in this country, and their advantages have, for several years, been well understood in America.

It may be stated as a remarkable application of the power of this engine, that a *tilt hammer* is now worked by it. This is a large hammer, raised about three feet high by a power derived from the engine, and then allowed to fall on a bar of steel or iron, on which its immense weight produces any effect required. Mr. Ruthven's engine is employed in boring, turning, and planing iron; turning two grindstones; and in pumping water and forcing it into the boiler. In addition to the tilt hammer, a blowing machine for his forges is also preparing to be added to it.

north and south, the ends being in consequence denominated, respectively, the north and south poles of the magnet. If we suspend two such bars near each other, it will be seen that the poles in each, which bear the same name, and which, when the magnets were separate, pointed the same way, repel each other with violence, while the north pole of the one, strongly attracts the south pole of the other, and *vice versa.**

It is not necessary, however, that these bars should always be straight. They are often bent into the form of a horseshoe or semicircle; and in this shape they retain the properties of attraction and repulsion which have just been noticed. It is by means of such magnets that one of the simplest examples of the mechanical application of the principle I have mentioned, has been exhibited; and in the following manner:—Fix two semicircular magnets horizontally in the same plane, so that the north and south poles of the one shall be opposite to the south and north poles of the other respectively, and at the distance of about an inch. Suspend in the interval between them a bar magnet of sufficient size, and observe the position it will take. It will immediately be attracted by the fixed magnet, whose north and south poles are nearest to its own south and north poles, and will cling to it with a force proportioned to the power of the magnet. Next reverse the position of the semicircular magnets, by turning them simultaneously, so that their north poles shall change places with their south poles; the bar will of course undergo a corresponding change. By the aid of a substantial wooden pendulum, into which the bar is fixed, and which is nicely hung on knife edges, a reversing apparatus may be worked, and when the machine is once set agoing, it will continue to act, the bar being driven from one magnet to another with the velocity of two or three hundred vibrations in a minute.

Such an application of magnetism, however, we might despair of rendering effective for mechanical purposes, the power being small, and the mode of working inefficient.

* [And so, *the case being reversed.*—Am. Ed.]

I have now, however, to state a method which has lately been discovered, of exciting magnetic power to a much greater degree than has ever been effected by the permanent or simple magnet, and in a way much more applicable to machinery. This consists in employing a voltaic battery,* generally of trifling power, by means of which magnetism may be generated in a bar of soft iron, by simply wrapping it with a lengthened coil of copper wire, previously covered with an envelope of silk or cotton thread, and then connecting the ends of the wire, one with the copper, and the other with the zinc element of the battery. The bar is thus at once converted into an electro-magnet, and possesses, so long as the communication continues, all the properties of a permanent one, the power generated increasing in proportion to the quantity of wire employed. With sixty feet of wire, for example, Professor Henry caused such a bar as we have described to raise seven pounds avoirdupois, but when the wire was increased to eight times the length, he found it to have acquired the amazing lifting power of six hundred and fifty pounds.

But that which renders the electro-magnet likely to become valuable as a moving power, depends chiefly on another principle. Unlike the permanent magnet, the polarity of its two ends results entirely from the connexion which the ends of the wire are made respectively to have with the copper or zinc of the battery ; so that, as often as this communication is interrupted, the bar loses most of its magnetic properties, and when the connexion is reversed, a corresponding change takes place in the poles, —that becoming instantly north which formerly was south, and *vice versa*.

The mode of generating motion by such an agent will easily be understood by supposing a case. Let a horse-shoe electro-magnet be fixed in a perpendicular position, with its poles pointing upwards, and let there be suspended over them a bar magnet. This bar will, of course,

* [The voltaic battery is an apparatus for the developement of galvanic electricity ; and is so named from its inventor, the philosopher Volta.—Am. Ed.]

immediately arrange itself according to the common rule of magnetism, its north and south poles seeking respectively the south and north poles of the electro-magnet. Next, let the ends of the coil of wire be shifted, so that the end which communicated with the copper may now be connected with the zinc, and that attached to the zinc may now communicate with the copper. The electro-magnet immediately reverses the polarity of its ends,—the north pole acquiring south polarity, and the south pole becoming converted into the north. The suspended magnet turns quickly round, under the influence of the new attractions and repulsions, and if the process be repeated, it acquires a rotary motion, more or less rapid, according to the rapidity with which these changes are made. It will be unnecessary to pursue this subject further, as might be done, by showing to what an extent power may be rendered available, by the use of a number of electro-magnets at once; and how the nature of the discovery may be enhanced by employing electro-magnetism as well in the revolving as in the stationary parts of the apparatus. The intelligent reader will easily fill up the blank for himself, and will readily comprehend how the principle thus manifested may be applied to the purposes of machinery.

The ingenuity of practical men has already begun to apply it under a vast variety of modifications, some of which have been proved to be perfectly available for the most important purposes of mechanism. Mr. M'Gauly, in Ireland, and Mr. Davenport and Dr. Page, in the United States, seem to have been hitherto the most zealous and most successful adventurers in this important field,—the last-mentioned gentleman having, in 1837, produced an instrument capable, as he affirms, of generating a rate of revolution equal to six thousand in a minute. It would appear that, up to a very recent date, the only electro-magnetic machine actually in use, was one in the occupation of Mr. Sturgeon of Woolwich, employed for pumping water and other mechanical purposes.

To what a train of reflections does this discovery give rise, and what an exposure does it make of the ignorance

of man, even amid the boasted progress of science and improvement! For how many hundred years have we been acquainted with the properties of the magnet! How long have we been habituated to the phenomenon of the voltaic battery: and yet, with the elements of a power so extraordinary daily in our hands, we have failed, till this late hour, in effecting this important and valuable invention, which, though among the simplest, is likely to be among the most useful, of the modern applications of the physical properties of matter. Then to what an unfathomable depth of future discoveries does this seem to open the avenue! Who can tell what valuable treasures lie hid among the simple elements with which we are familiar,—or how amply these may yet be made to cooperate with man in the coming ages of his history!

G. J. C. D.

TWELFTH WEEK—TUESDAY.

ARCHITECTURE.—ITS MODERN HISTORY AND PRACTICE—LIGHTHOUSES—THE EDDYSTONE LIGHTHOUSE.

Among buildings of public utility, lighthouses take, in a commercial country, a prominent station. These edifices, however, have diminished, both in number and utility, since the use of the mariner's compass; and, instead of being placed on every headland, as was probably the case in the earlier ages of navigation, where trade was carried on to any extent, as in the Mediterranean, they are now chiefly confined to the marking of dangerous rocks at sea, and the most projecting points of the shore. The most remarkable lighthouse of antiquity was that of the Pharos of Alexandria, which was accounted one of the seven wonders of the ancient world. It is said to have been erected by Ptolemy Philadelphus, about three hundred years before the Christian era, and is alleged, probably with some exaggeration, to have been a hundred statures of a man, or about five hundred and fifty

feet, in height. It is described as a square building of exquisite workmanship. On the top, a fire was kept constantly burning, which some authors assert could be seen at the distance of a hundred, and others of even seven hundred miles ;* but which Josephus more soberly and truly limits to the distance of three hundred stadia, or about forty-two British miles. Even at this distance, on account of the convexity of the earth's surface, it could only be seen by a spectator elevated upwards of a hundred feet above the sea.

The utility of lighthouses to the mariner, is too great and too obvious to suffer them to be neglected in modern times. The object of the present paper, however, is not to give even the slightest sketch of the history of these useful works, but to lay before the reader some account of what may be ranked among the most arduous and successful architectural operations of modern times, in the erection of successive lighthouses on the Eddystone reef.†

This extensive reef is situated in the English Channel, at the entrance of Plymouth Sound, and is dangerous to mariners, and particularly disadvantageous on account of its position as regards the celebrated naval station in its immediate neighborhood. It had, at an early period, therefore, been a matter of anxious consideration to effect the erection of a beacon on a rock of this reef ; but there were circumstances which rendered such an undertaking particularly hazardous. From the nature of its position, it lies open to the remarkable swells of the Bay of Bis-

* It is said, very absurdly, by Abulfeda, that this light, when increased by the use of a speculum, could be seen at Constantinople, which is seven hundred miles distant from Alexandria !

† I am indebted for an opportunity of giving so detailed a history of the celebrated lighthouses erected on this remarkable spot, to my friend, Mr. Stevenson of Edinburgh, who was so good as to put into my hands the account published by Mr. Smeaton, the ingenious architect of the last erection on the Eddystone reef, a kindred genius, whose labors he has imitated and rivalled on the Bell Rock. As Mr. Smeaton's work is exceedingly scarce, and, because of its minute scientific details, is scarcely suitable to the general reader, I persuade myself that the account I have here given will be acceptable

cay and the Atlantic Ocean. "It is to be observed," says Mr. Smeaton, in his highly interesting account of his own operations, "that the soundings of the sea from the southwest towards the Eddystone, are from eighty fathoms to forty, and every where, till you come near the Eddystone, the sea is full thirty fathoms in depth; so that all the heavy seas from the southwest, come uncontrolled on the Eddystone rocks, and break thereon with the utmost fury."

Mr. Smeaton further remarks, that, on account of the configuration of the rocks, which lie in a sloping manner towards the southwest, the situation is still more exposed to the violence of the waves; for as they come unchecked from the deep water, and meet the slope of the rocky bottom "rather suddenly at last, though gradually," they are swelled to such a degree in storms and hard gales of wind, as to break upon the rocks with greatly augmented fury. In moderate, and even in calm weather, the effect of this peculiarity is strongly felt; "for the libration of the water caused in the Bay of Biscay, and in hard gales at the southwest, continues in these deep waters for many days, though succeeded by a calm; insomuch, that when the sea is, to all appearance, smooth and even, and its surface unruffled by the slightest breeze, yet those librations still continuing, which are called the ground-swell, and meeting the slope of these rocks, the sea breaks upon them in a frightful manner, so as not only to obstruct any work being done upon the rock, but even the landing upon it, when, figuratively speaking, you might go to sea in a walnut-shell." Add to this, that the rock, which alone is fit for the erection of a lighthouse, presents towards the west so abrupt a face, that the seas, when swelling upon it even in moderate weather, meet a sudden check, so that they frequently fly to the height of thirty or forty feet, falling down in copious showers on the surface of the rock.

These circumstances rendered the erection of any kind of building on the Eddystone a work of peculiar difficulty, insomuch, that it was deemed altogether impractible, till a person of the name of Winstanley, a

man of eccentric genius, undertook, and, in the year 1696, amidst many difficulties and obstructions from the weather and the sea, executed this formidable task. This erection, however, which is understood to have been chiefly of wood, existed only four years. In a violent storm it was swept away, along with its ingenious builder, (who happened to be in it at the time,) and its usual inhabitants, the light keepers.

The possibility of effecting this important object having thus been ascertained, and the nature of the difficulties to be encountered having been more distinctly unfolded, a new lighthouse was soon afterwards erected on the same spot, by a Mr. Rudyerd of London. It was a work of three years, and was executed also chiefly of wood, in a masterly style, after the manner, and on the principles of ship carpentry. The under part consisted of alternate layers of wood and moorstone or granite, the upper part strongly framed of oak timber, and cased with firmly jointed planks. The form was circular. The diameter of the base was about twenty-three feet, and it rose, gently tapering, to the height of ninety-two feet. It was planned and executed with much judgement, and, in the opinion of Mr. Smeaton, might have stood for an unlimited period, or, at all events, till the timber had suffered decay,—a tendency to which, however, at last appeared.* But it was accidentally destroyed by fire, after a light had been exhibited in it for upwards of forty-seven years.

It is pleasing to record the following anecdote, mentioned by our author, which is so honorable to the character of Louis XIV., and forms so agreeable an exception to the usual ferocity of war. That monarch was at war with Britain while Mr. Rudyerd's building was in

* Mr. Smeaton, after giving an account of this second lighthouse, says of it, that by withstanding the violence of the sea in such a situation for nearly half a century, and then being destroyed not by water but by fire, it proves the practicability of a similar erection in any exposure in the known world; for, adds he, "having attentively read and considered what is contained in the respective voyages of Anson, Byron, Cook, and Phipps, the most scientific navigators that modern times have produced, I do not find, in all their accounts, such an exposure to the sea's uttermost violence as at the Eddystone rocks."

progress, and a French privateer seized upon the men at work on the rock, together with their tools, and carried them to France, the captain being, doubtless, in expectation of a reward for an achievement which was so seriously to injure the commercial interests of the enemy. "While the captives lay in prison, the transaction reached the ears of the French monarch. He immediately ordered them to be released, and the captors to be put in their places, declaring, that though he was at war with England, he was not at war with mankind. He, therefore, directed the men to be sent back to their work with presents."

TWELFTH WEEK—WEDNESDAY.

ARCHITECTURE.—ITS MODERN HISTORY AND PRACTICE—THE EDDYSTONE LIGHTHOUSE, CONTINUED.

For the erection of a third lighthouse on the Eddystone reef, Mr. Smeaton was judiciously selected, a person since justly celebrated for his extraordinary talents as an engineer, but not bred to this business, and then known merely as a man of ability and genius. The ingenuous account which Mr. Smeaton himself gives of the circumstances which led the proprietors* to fix on him as their engineer, is curious and instructive. Mr. Weston, one of the proprietors, and a man of acuteness and liberal ideas, applied to the Earl of Macclesfield, then president of the Royal Society, as a nobleman likely, from his intercourse with men of talent, to recommend a fit person for so arduous an undertaking. "Lord Macclesfield told him, that there was one of their body whom he could venture to recommend to the business; yet, that the most material part of what he knew of him, was his having, within the compass of the last seven years, recommended himself to the society, by the communi-

* The former lighthouse had been built by the contract of a private company with government; and this contract had still more than half a century to run.

cation of several mechanical inventions and improvements; and though he had, at first, made it his business to execute things in the instrument way, (without having ever been bred to the trade,) yet, on account of the merit of his performances, he had been chosen a member of the society; and that, for about three years past, having found the business of a philosophical instrument maker not likely to afford an adequate recompense, he had wholly applied himself to such branches of mechanics as he (Mr. Weston) appeared to want."

On this recommendation the proprietors did not hesitate to act. They had found a man who, "from natural genius, had a turn for contrivance in the mechanical branches of science;" and such a person, they conceived, was more likely to execute a task where peculiar ingenuity was required, than a mere proficient in the ordinary routine of the engineering profession. The event justified their choice. Mr. Smeaton was every way fitted for this important undertaking; and he entered upon it with zeal and alacrity, applying the whole resources of his genius to its execution. Contrary to the prejudices of many, who thought that the elasticity of wood could alone withstand the fury of the waves in such a situation, he resolved to erect the building entirely of stone, ingeniously dove-tailed together, and laid in a strong and durable cement. His publication details at great length the workings of his mind on this subject, and the various experiments by which he verified his views; and there cannot easily be conceived a more interesting or improving employment to a mind of kindred feelings, than to follow him in his admirable account.

For these details, I must refer the reader to the publication itself. But there is something so striking in the means by which this ingenious man arrived at the conclusion, that an enlargement of the base of the building was preferable to the form of a regular cone, which was that of the previous lighthouse, that I at once insert it. "On this occasion," says he, "the natural figure of the waist or bole of a large spreading oak presented itself to my imagination. Let us for a moment consider this tree:

Suppose at twelve or fifteen feet above its base, it branches out in every direction, and forms a large bushy top, as we often observe. This top, when full of leaves, is subject to a very great impulse from the agitation of violent winds; yet partly by its elasticity, and by the natural strength arising from its figure, it resists them all, even for ages, till the gradual decay of the material diminishes the coherence of the parts, and they suffer piecemeal by the violence; but it is very rare that we hear of such a tree being torn up by the roots. Let us now consider its particular figure. Connected with its roots, which lie hid below ground, it rises from the surface thereof with a large swelling base, which at the height of one diameter, is generally reduced by an elegant curve, concave to the eye, to a diameter less by at least one third, and sometimes to half of its original base. From thence, its taper diminishing more slowly, its sides by degrees come into a perpendicular, and, for some length, form a cylinder. After that, a preparation of more circumference becomes necessary for the strong insertion and establishment of the principal boughs, which produces a swelling of its diameter. Now, we can hardly doubt, but that every section of the tree is nearly of an equal strength in proportion to what it has to resist; and, were we to lop off its principal boughs, and expose it in that state to a rapid current of water, we should find it as much capable of resisting the action of the heavier fluid, when divested of the greater part of its clothing, as it was that of the lighter, when all its spreading ornaments were exposed to the fury of the wind; and hence we may derive an idea of what the proper shape of a column of the *greatest stability* ought to be, to resist the action of external violence, when the quantity of matter is given whereof it is to be composed."

There is something exceedingly pleasing in this application of a lesson derived from the vegetable kingdom, which bears such direct testimony to the supreme wisdom of the Creator; and the event proved that the deduction was just. The building artfully rooted in the rock, and standing on an extended base, has, like the oak which

was taken for its model, hitherto resisted all the fury of the tempest; and it promises to endure as long as the materials of which it is composed.

It was necessary for Mr. Smeaton to take every possible precaution for insuring the stability of his fabric; for the accounts which he had received of the violence it would have to resist, were most fearful. Mr. Winstanley had found that the sea sometimes "*buried*" the lantern, although more than sixty feet high; he had, therefore, encompassed the whole building with "a new work of four feet in thickness, from the foundation," and raised it forty feet higher; yet, though now rising to the height of a hundred and twenty feet to the top of the vane, he tells us, in his narrative, that "the sea in time of storms, flies in appearance *one hundred feet* above the vane; and at times doth cover half the side of the house and the lantern, as if it were under water." Mr. Smeaton bears testimony to the truth of this statement. Speaking of the view which he took of the finished structure, from an elevated position on land during a storm, he says, "I was astonished to find that the account given by Mr. Winstanley did not appear to be at all exaggerated. At intervals of a minute, and sometimes of two or three, an overgrown wave would strike the rock and the building conjointly, and fly up in a white column, wrapping it like a sheet, rising at least to double the height of the house, and totally intercepting it from the sight. Of this column I made an eye-sketch at the time;* and must further observe, that while I was in the lighthouse, I particularly noticed the manner in which the waves began to gather, during a gale, as soon as they came so near the house as to be sensible of the sloping rocks underneath them. Those waves, by degrees towering higher as they came nearer, formed a deep hollow sea at the foot of the building, and then falling into it, struck it with all imaginable fury."

The necessity of employing individuals to inhabit this solitary, and often inaccessible erection, gave rise to two incidents, which seem worthy of being recorded.

* This sketch is represented in an engraving in the frontispiece of the publication, which it is scarcely possible to look at without shuddering.

For many years after the establishment of the light-house, it was attended by only two men. Their duty was easy, consisting merely in lighting, snuffing, and renewing the candles during the night, which they did alternately, each watching four hours. It might perhaps be instructive to know how two illiterate men spent their idle time in that voluntary prison, in the midst of the waves ; what were their mutual communications, and on what terms they lived, cut off, as they were, from intercourse with the rest of their kind, and unable, probably, from want of education, to improve their minds by reading. An anecdote is related, on the authority of Lord North, who mentioned it in the House of Commons, which shows that these men were not always on the habits of friendship, which were so necessary to their comfort. On one occasion, when some visitants happened to land on the rock, from motives of curiosity, one of them observed to the light-keeper, who was showing the works, how very comfortably they might there live, secured in a competency, at a distance from the turmoils of the world. " Yes," replied the man, " very *comfortably*, if we could but have the use of our *tongues ;* but it is now a full month since my partner and I have spoken to each other." I fear that, in this anecdote, we have only an indication of the natural folly of the human heart, which, by the indulgence of selfish passions, aggravates the evils of its condition, and eludes the enjoyment of the good within its reach.

It is not known whether or not it be of these ill-assorted comrades, that the following distressing account is given. " It happened," says Mr. Smeaton, " that one of the men was taken ill, and died ; and, notwithstanding the Eddystone flag was hoisted, yet the weather was such for some time, as to prevent any boat from getting so near the rock, as to receive any communication. In this dilemma, the living man found himself in an awkward situation, being apprehensive, that, if he tumbled the dead body into the sea, which was the only way in his power to dispose of it, he might be charged with murder. This induced him, for some time, to let the dead corpse lie, in hopes that

the boat might be able to land, and relieve him from the distress he was in. By degrees, the body became so offensive, that it was not in his power to get quit of it without help; for it was near a month before the attending boat could effect a landing; and then it was not without the greatest difficulty that it could be done, when they did land. To such a degree was the whole building filled with the stench of the corpse, that it was all they could do to get the dead body disposed of, and thrown into the sea."

It is not easy to conceive a more dreadful situation than this, to a human being with a mind of any sensibility. Alone on the sea-beat rock, left to his own miserable reflections, with the putrefying remains of his companion beside him, to remind him of his own approaching end; to remind him also of mutual quarrels and injuries, perhaps of corrupting conversations, which would then press with unspeakable weight on his conscience,—without a regular employment to occupy his mind, without a friend to whom he could unburden his heart, perhaps without any just views of religion, but with dark and awful forebodings,—there can scarcely be imagined any thing more appalling, or more full of lessons of spiritual instruction.

TWELFTH WEEK—THURSDAY.

ARCHITECTURE.—THE THAMES TUNNEL.

One of the most remarkable undertakings in modern times connected with architecture, is the attempt to form a communication between the two banks of the Thames, at London, by means of a subterraneous passage or tunnel near Rotherhithe. This plan was first suggested by some private individuals, in the year 1802, who formed themselves into a company, and having taken surveys, obtained an act of Parliament, and, under direction of an experienced architect, attempted to pioneer their course by means of a drift-way; but, after this preliminary work had been

carried on for seven years, and had proceeded to a considerable extent, the whole scheme was abandoned as impracticable.

The celebrated Mr. Brunel was at last applied to, by one of the most spirited projectors of the undertaking; and this able engineer, having turned his attention to the subject, formed the bold plan of carrying on both the excavation and the structure on a full scale at once.

It is instructive to remark, that the most important and best conceived schemes of ingenious men, have been aided in their execution by the hints which they have received from the operations of Creative Wisdom in the works of nature. I have already stated, that Mr. Smeaton took his idea of extending the base of the Eddystone lighthouse, with the view of giving it greater power of resisting the violence of the waves, by reasoning on the form of the oak,—thus deriving a most valuable principle from *vegetable* nature; Mr. Brunel obtained a hint equally important, in overcoming the peculiar difficulties of his undertaking, by borrowing from a remarkable contrivance of *animated* nature. The difficulty to be overcome, was, the guarding against the effects of the river in pressing on and pervading the strata through which he had to excavate his way. It had been found by the experience of the engineer formerly employed, that on certain strata the power of the tide was so great, that even the depth of thirty feet below the bottom of the river was no security against its influence. The first idea of the contrivance which appeared to Mr. Brunel best calculated for making an excavation fit for his object, under such an overwhelming head of water, was suggested by observing the operations of a worm called the teredo, on a piece of the keel of a ship. The erosions made by this curious insect led him to form a plan by which, as his specification describes it, he might make "a circular opening of sufficient capacity at once." His plan was to form simultaneously several contiguous excavations, by means of an apparatus which he has denominated the *shield*. It consists of twelve parallel frames lying close to each other, like so many volumes in a bookcase. Each frame, being nearly twenty-

two feet in height, is divided into three stories, the whole thus presenting thirty-six openings or cells. It is from these cells that the miners, operating by small quantities at a time, like so many teredos, are able to erode the ground in front, while others at the back bring up a substantial brick structure, which, continuing the similarity, may be likened to the incrustation formed by the insect. For locomotive action, each frame is provided with two substantial legs, resting on equally substantial feet, or slippers, as they are technically called. These legs are furnished with articulations that fit the frames for a pacing movement, when it is necessary to advance, thus borrowing again from the mechanical contrivances of Creative Wisdom in the animal world.

It would lead us into too minute a detail, to state all the difficulties which were to be encountered in this extraordinary work; but some idea of them, and of the ingenuity with which they have been overcome, may be conceived, when it is remembered, as already stated, that the influence of the tide on the strata at the bottom of the river, was found to extend to the depth of at least thirty feet; and when to this is added another fact, of which the engineer was experimentally made aware, that, at the depth of about eighty or eighty-five feet, there was a very dangerous stratum of quicksand, which it was necessary to avoid. Between these two dangers, it was of essential importance to operate so as to keep as much as possible out of the influence of both. Of the two, the effect of the tide was most to be dreaded; and, such was the nature of this difficulty, that it required all the resources of art to conquer it. In its natural state, the ground was found to be compact, even when it consisted of sand or gravel; but an excavation on so large a scale could not be made, without opening new vents for the exudation of water, which disturbed the strata, decomposing and softening some, kneading others into various degrees of consistency, and reducing others almost into a liquid state.

Notwithstanding these discouragements, however, the work was commenced, in the month of March, 1825. The scheme was to carry two arch-ways, on the plan of

a double arcade, below the river, of sufficient dimensions to form commodious carriage-ways; but, in order to accomplish this, it was found necessary to erect an immense mass of brick-work, thirty-eight feet in width, and twenty-two feet sixteen inches in height externally, of which the arch-ways in the centre were only to form a comparatively small proportion. The work proceeded with various success, and under constant danger, till the 18th May, 1827; during which interval, the ground was frequently in so loose a state, that the river deposits were found in the way of the excavation, and the influx of water was excessive. Once, indeed, a shovel and hammer having been left at the bottom of the river, during an inspection by a diving-bell, these tools disappeared, and were soon afterwards found, in advancing one of the frames of the shield, having descended at least eighteen feet into the ground.

On the day last mentioned, some vessels having been accidentally moored over the head of the tunnel, this obstruction to the stream caused those loose substances which protected the softer ground from the action of the tide, to be washed away; in consequence of which, the river soon made its way into the tunnel, forming at first "a transparent curtain between the shield and the brick structure." Every exertion to oppose its progress proved unavailing. The river broke in, and filled the tunnel. On examining the whole with the diving-bell, the structure was ascertained to be perfectly sound, and the shield, to all appearance, undisturbed. A plan was immediately adopted to stop the gap, by means of clay in bags, armed with small hazel rods. About three thousand tons of these materials, along with some loose soil, were required to fill the chasm, which was found to exceed thirty-eight feet in depth.

The tunnel was cleared of water by means of the steam-engine, which had been originally erected for the purpose of draining, and the work was recommenced with renewed spirit; but on the 12th January, 1828, a second irruption of the river took place, in which six men lost their lives, and the younger Brunel very narrowly escaped.

These repeated irruptions, though discouraging, by no

means damped the hopes of the ingenious engineer. He had, by the extraordinary resources of his mind, been able to overcome difficulties, which had been esteemed insurmountable, having constructed six hundred feet of tunnel, the sectional surface of which was greater than that of the House of Commons, through ground wherein experienced miners had not been able even to construct a drain. It is true, indeed, that in the work still to be performed, the difficulties of the undertaking, instead of being diminished, were expected to increase; but experience had taught much, and there appeared to be no obstacle which genius and perseverance might not be able to overcome.

The pecuniary resources of the company, however, were now nearly exhausted, and it was necessary to discontinue the work till fresh funds could be obtained. After a cessation of seven years, government was induced to furnish pecuniary aid, for the accomplishment of what might well be called a great national object,—not so much, indeed, on account of the immediate advantage to be gained,—though this will be considerable,—as on account of the triumph which it will afford to practical science, and the stimulus which may thus be given to still more gigantic undertakings.

During the second irruption of the river, the shield had been torn in pieces by the violence of the stream; but a new and more substantial shield was formed, and the work was so actively carried on, that by the middle of September, 1837, a very great advance had been made towards low-water-mark, on the Wapping side of the river. At this period, an irruption again took place; but, owing to the precautions which experience had suggested, it was not attended with any violence, and comparatively little evil resulted, beyond the interruption of the work, and the filling of the tunnel with water and mud. The aperture was again filled up with bags of clay, and the operation is at present proceeding with so much spirit, that it is confidently expected that this great work will, in a short time, be placed beyond all danger.

TWELFTH WEEK—FRIDAY.

MISCELLANEOUS REFLECTIONS ON AUTUMNAL APPEARANCES.

I SHALL, in the present paper, group together some extracts from different authors, containing interesting remarks on autumnal appearances towards the end of the season.

"The last rays of the summer's sun," says Sturm, "now fall feebly on the earth: every thing is changed. That country, which so lately bloomed in verdant beauty and blushing charms, is becoming poor, withered, and barren. We no longer see the trees rich in blossoms, nor the spring gay with verdure; the magnificence of summer, displayed in a thousand variations of colors, whose richness is relieved by the beautiful green of the meadows and waving groves, is no more. The purple hue of the vine has faded, and the gilded ears no longer ornament the fields. The last leaves of the trees are falling; the pines, the elms, and the oaks bend beneath the blasts of the fierce north wind; and the fields, which have lavished upon us so many gifts, are at length exhausted.

"These sad changes must necessarily diminish our pleasures. When the earth has lost her verdure, gayety, and beauty,—when the fields are swampy, and gloominess reigns,—man is deprived of many of those delights, that he receives through the medium of sight. When the earth is thus destitute, nothing is seen around but a rugged and uneven surface. The songs of the birds no longer rejoice our ears, and there is nothing that recalls to our minds that universal delight, which we so lately shared with all animated beings. The melody of the birds yields to the murmuring of the waters, and the howling of the winds. The fragrance of the fields is gone, and the sense of feeling is pained by the impression of cold and humid air.

"But, in the midst of these gloomy prospects, we have reason to acknowledge how faithfully Nature fulfils the eternal law prescribed to her, of being useful at all times

and seasons of the year. Though, at the approach of winter, the country is desolate, and stripped of its most beautiful ornaments, it still presents, to a properly organized mind, the image of happiness. We may say with gratitude, 'Here we have seen the corn grow, and these dry fields crowned with an abundant harvest; and, notwithstanding the orchards and gardens are now deserted, the remembrance of the presents we have received from them, inspires us with joy, though we are exposed to the influence of the north wind.'

"The fruit-trees have now shed their leaves; the grass of the meadows is withered; dark clouds gather in the sky; the rain falls in heavy showers; the roads are impaired, and walking abroad is almost impracticable. The man who has no resources in himself, murmurs at this change; but the philosopher contemplates it with satisfaction. The sere leaves and withered grass, moistened by the autumnal rains, form a rich manure to fertilize the land. This consideration, and the sweet expectation of spring, naturally ought to excite our gratitude for the tender cares of our Creator, and inspire us with a perfect confidence in Him. Whilst the earth has lost its beauty and external charms, and is exposed to the complaints of those it has nourished and delighted, it has commenced its labors anew, and is busily employed in secret working for the future good of the creation."

To these just, but somewhat trite, reflections, may be added the following contemplations on an autumnal evening, from another author, of a deeper and more melancholy cast of thought.

"It is as combining the decline of the day with that of the year,—the period both of beauty and decay,—that an evening in autumn becomes so generally the parent of ideas of a solemn and pathetic cast. Not only, as in the first of these instances, do we blend the sunset of physical with that of moral being; but a further source of similitude is unavoidably suggested in the failure and decrepitude of the dying year,—a picture faithfully, and, in some points of view, mournfully, emblematic of the closing hours of human life.

"With the daily retirement of the sun, and the gradual approach of twilight,—though circumstances, as we have seen, often associated in our minds with the transitory tenure of human existence,—there are usually connected so many objects of beauty and repose, as to render such a scene, in a high degree, soothing and consolatory; but, with the customary decline of light, are now united the sighing of the coming storm,—the eddying of the withered foliage;—

> "'For autumn comes, in solemn gold,
> And all the gaudy leaves are strown;
> The leaves look barren, thin, and cold,
> Beneath the darkening tempest's frown.
> The hunter wanders by the wold,
> By heath, and fell, and mountain brown,—
> By hill, and dale, and river head,
> Where the dead leaves find a bed,
> Hectic, and gray, and fever-red.'

"These are occurrences, which so strongly appeal to our feelings, which so forcibly remind us of the mutability of our species, and bring before us with such expressive solemnity, the earth as opening to receive us, that they have, from the earliest stages of society, and in every stage of it, been considered as typical of the brevity and destiny of man. 'Like leaves on trees,' says the first and greatest of all uninspired writers,*

> "'Like leaves on trees the race of man is found,
> Now green in youth, now withering on the ground;
> Another race the following spring supplies,
> They fall successive, and successive rise.
> So generations in their course decay,
> So flourish these when those are passed away.'"†

The sentiment of melancholy which the closing weeks of autumn thus forcibly impress on the mind, is not, however, of a painful or oppressive nature. It is, on the contrary, productive of a chastened pleasure, which tends to elevate our moral nature, and which thus affords us a new proof of the never-failing beneficence of the God of the Seasons. This effect is finely expressed by St. Pierre,

* Homer, Iliad, iii.

† Drake's Evenings in Autumn.

with whose reflections on such a state of mind I shall close these extracts.

"Beneficent Nature converts all her phenomena into so many sources of pleasure to man; and, if we attend to her procedure, it will be found that her most common appearances are the most agreeable. I enjoy pleasure, for example, when I see old mossy walls dripping, and hear the whistling of the wind, mingled with the pattering of rain. These melancholy sounds, in the night time, throw me into a soft and profound repose.

"I cannot tell to what physical law philosophers may refer the sensations of melancholy, but I consider them as the most voluptuous affections of the soul. Melancholy is dainty. This proceeds from its gratifying at once the body and the soul; the sentiment of our misery and of our excellence.

"In bad weather, the sentiment of my human misery is tranquillized by seeing it rain, while I am under cover; by hearing the wind blow violently, while I lie comfortably in bed. I in this case enjoy a negative felicity. With this are afterwards blended some of those sentiments of the Divinity, the perception of which communicates such exquisite pleasure to the soul. It looks as if Nature were then conforming to my situation, like a sympathizing friend. She is, besides, at all times so interesting, under whatever aspect she exhibits herself, that, when it rains, I think I see a beautiful woman in tears. She seems to me more beautiful, the more that she wears the appearance of affliction.

"In order to be impressed with these sentiments, which I venture to call voluptuous, I must have no project in hand of a pleasant walk, of visiting, of hunting, which perhaps would put me into a bad humor. To enjoy bad weather, our soul must be travelling abroad, and the body at rest. From the harmony of those two powers of our constitution, the most terrible revolutions of Nature frequently interest us more than her gayest scenery."*

* Studies of Nature, 12th study.

TWELFTH WEEK—SATURDAY.

THE LANDSCAPE AT THE CLOSE OF AUTUMN.

THE weather of each season not only differs from that of another, in its main features and characteristics, but in many minute circumstances, which are not so frequently the subject of remark. In spring and autumn, for example, though the length of the days, and the amount of sunshine are nearly equal, yet the state of the atmosphere, and the composition of the whole landscape, are, in most respects, entirely dissimilar.

The fields, relieved of their various produce, at present wear a brown and withered aspect. Occasionally, an aftergrowth of tender grass sprinkles the decaying stubble with its verdure; but the farmer soon disperses his cattle over the field, and they immediately graze it bare. The hawthorn hedges have lost nearly all their foliage, though many of their ripe and ruddy haws still survive, to be mellowed by the earlier winter frosts. They now discover the bird-nests which, the summer long, they concealed from the schoolboy's curious eye. The woods are almost stripped of their robes, and the long, rank, but now withering grass beneath the trees, is matted with the multitude of putrefying leaves. The brooks, of all sizes, are now much less limpid and gentle in their flow, than during the dry days of summer. They are sensibly swollen with rains; and, as the soil is now bare and miry, their hitherto stainless waters have become turbid and discolored.

The morning, at this period of the year, is in general moist and raw. The full-formed and pearly dew, so common in summer, is seldom seen; but the ground is wetted by the chilling and uncomfortable fog. As the day advances, however, the sky brightens, the sun shines forth, and the ground gets drier. Yet a soft, white haze broods over the scene, and covers, as with a thin veil, the brows of the loftier hills. There is a calmness in the

air, and in the woods,—a melancholy and even mournful tranquillity, that is, perhaps, the distinguishing characteristic of the season. The wild winds of winter have not yet begun to blow; but the land seems to lie in silent expectation of their desolating blasts; and we feel as during the ominous pause, before the full outbreak of the tempest. The earth has matured and yielded up to man her yearly produce; and the energies of that "all-bearing mother," as if exhausted, seem to demand the repose of winter. Vegetation almost ceases, and universal death (which, however, is but the predecessor of another life) is fast spreading over all the families of flowers, shrubs, and trees. The brilliant tints lately assumed by the woods, and which at first might appear to indicate a new and brighter foliage, are rapidly fading into a sombre hue, where the boughs are not yet bleak and leafless. Here and there only, some hardier or later tree still flares, amidst a mass of naked branches, in its brightest autumnal robes. There is a sad beauty in the scene, which cannot well be hid even from the common eye. Traces of summer loveliness are still every where to be seen; and the few flowers that yet bloom in the hedges, or by the walls, or on the sheltered woodland bank, have a singular sweetness, a forlorn and surviving beauty of their own.

The transition from autumnal richness to the desolation of winter, is gradual, gentle, and even beautiful. The nature-loving eye can even be pleased with the last signs of vegetation still hanging upon the branches, or silently dropping to the ground.

> "The beauty of decay
> Charms the slow-fading year,
> And sweetly fall away
> The flowers and foliage sere;
> And lingering summer still we see
> In every half-dismantled tree."

But little singing of birds disturbs the still life of a day in the close of autumn. What birds still remain with us are almost dumb, and seem to feel and mourn the approaching rigors of the season. A few feeble and plaintive notes, alone express their sadness. But for the rousing

echoes of the sportsman's gun by day, and the cawing of the "blackening train" of crows, flying in the twilight to their roost in the distant woods, scarcely a sound would break the deathlike and all-pervading stillness.

The farmer, with his crop now gathered in, and his winter wheat sown, enjoys his consciousness of security, and, like the sailor who foresees the impending storm, is prepared for the severity of the coming season. His well-filled and neatly trimmed barn-yard is a striking sign of rustic plenty, the object and precious reward of all his toils. Yet, though rejoicing over the riches of the year, he, not unmindful of another, is ploughing his stubble fields, that the soil may be exposed to the pulverizing effects of the winter's frost. Behind him, settling upon the newly-turned up furrow, flock the hungry crows, in quest of worms, and other food. If we look from the farm to the garden, here too we see nothing but symptoms of past fertility, and preparations for the coming ungenial frost and snow. The delving of the cleared soil, the planting of a few hardy greens for winter use, and the pruning of fruit-trees, form the chief occupations of the gardener, professional or domestic. The calm and settled weather invites him to his work, and gives ample scope to his habits of precaution.

Thus gracefully and gently wanes the dying year. There is something in the gradual coming on, the calmness, and the beauty of the transition, which powerfully suggests to us the goodness and wisdom of the Author and Controller of the seasons. Were the air suddenly to assume a winter temperature, and the forests and fields all at once, in a single night, we shall say, to lose their beautiful foliage, how, even with the greatest precaution, would this rapid change invade our comforts, endanger our health, and derange our agricultural operations. But, under the present constitution of things, our frames are insensibly prepared for the winter's cold. There is a seasonable pause for the farmer and the gardener to set about their preparatory processes, and a gradual removal from our sight of the splendid decorations of autumn. The beauty of the woods lingers ere it finally departs,

and each much-loved autumnal flower seems frequently to bid us farewell, in gradually sinking to the earth. In all this, every heart, not steeled to natural emotion, must feel a designed goodness, and gratefully acknowledge the unremitting care of a kind and bountiful Father.

It were easy to point out, in this gentle decay of the year, many analogies to what we daily witness in human life; as, for example, that which obtains between the said decay, and the quiet ebbing of life in the aged and almost ripened Christian, whose gray hairs fall peacefully like the undisturbed leaves, and whose time-worn frame is imperceptibly, and by slow degrees, fitted for the undreaded winter of the grave. But I enter not upon this pleasing and solemn subject: the reader requires no instruction to make of it a profitable theme of meditation.* J. D.

THIRTEENTH WEEK—SUNDAY.

THE FALL OF THE LEAF.

LET us suppose a stranger to visit some beautiful valley in summer, when the cloudless sun looks down on a mass of verdant and seemingly unfading umbrage. He wanders delighted through its pleasant woods, rustling with unnumbered leaves, loading the air with sweetly blending odors, and all echoing with the voice of song and the murmurs of streams. He especially fixes his eye upon the varied foliage that forms the canopy over his head, and admires its freshness and symmetry. He sees, in the millions of leaves "above, around, and underneath," the main element of that beauty and pleasing shade which render the whole scene delightful to his eye

* [On this subject, see, among other beautiful compositions, a hymn entitled 'The Autumn Evening,' by Rev. Mr. Peabody, of Springfield, and the 'Death of the Flowers,' by Bryant, one of the sweetest little poems in the language.—AM. ED.]

and heart. He departs, almost wishing them to be immortal. But suppose, again, that he returns at the latter end of autumn, and retraces his former steps. Where are now the leaves that beautified the silvan scene, and formed, as it were, its life and joy? They have disappeared from the trees, and are lying shrivelled and decayed at his feet, while the branches which they formerly adorned are lifeless and bare. How vividly is he impressed with the unceasing changes of Nature, and with the mortality diffused like an attribute through all her kingdoms.

Now, let us compare with this stranger some heavenly visitant, sent down to view this earth, and its busy inhabitants. On his first arrival, he beholds the various generations of men swarming in the fertile valleys and plains, some contending with the toils of life, others enjoying its delights, but all mingling in one vast and bustling community. He wonders at their ceaseless activity, and their splendid works. In their glory and strength they seem destined to live for ever. A century rolls away,—a mighty age upon earth, but scarcely a moment before the throne of God,—and again the angel descends upon our globe. He looks for the race he formerly beheld, but he only beholds their tombs. Their energy, their glory, and their gladness are gone; they have fleeted away, and the places that knew them once know them no more.

Every one must be struck with the moral of this comparison. Even the unobservant and thoughtless can see their destiny imaged forth by the fall of the forest leaves. Yet how few apply to their hearts and lives the lesson here so impressively taught, and muse, as the Christian observer ought, upon the evanescence of all sublunary things, their own inevitable decay, and their latter end. I would here address a solemn warning to all, and invite them to pause in devout meditation, while they behold the present state of the woods, and their fallen generations of leaves. The luxuriant verdure of summer, and the glowing tints of autumn, have vanished from the silvan scene. The night-frost has now dismantled the umbrageous forest, and strewn its withered garments upon the breeze. Our woodland walks, lately overarched with

green boughs, a fresh and rustling canopy, are warm and sheltered no longer, but piled up, and even obstructed, with the shrivelled wrecks of a sere and fallen foliage. Let us linger awhile amidst the bared and melancholy woods, now tossing in the cold winds of October, and endeavor to derive the appropriate lesson from the frailty and disappearance of their lost honors.

The frail families of our busy race, that people in succession this motley scene, are represented to every mind as falling under the icy touch of death, like the multitudinous forest leaves ; and annually is that picture of decay restored in all its colors, by the desolations of departing autumn. In many points this mournful analogy holds. As trees of every kind, and in every locality, lose their leaves, so all nations and families fleet rapidly away. Individuals, of every description, also, are subject to the same melancholy doom. The vigorous youth, the full-formed man, and the old man bowing under his years, are equally withered by the blast of death. Unexpectedly they fall from life, and are no more visible where they lived and walked. If some leaves, also, are not violently snatched from their boughs by the freezing gale, the surer process of natural decay at length effects their fall, and they at last follow their decaying predecessors. Thus again is it with man. The violence of various accidents, fire and flood, war, famine,and pestilence, or the diseases which he brings on himself, or inherits, cut off most of his race, many of them in the full prime of their days. If a few, escaping all these casualties, remain behind in their homes, they are only like the last leaves upon the bough. The juices of life at length dry up, and the survivors drop down silently, even though not a breath of wind agitates or disturbs their aged repose. Surely the race of man is frail and fleeting as the leaves !

In the Word of God, many impressive images are drawn from the leaves, the grass, and the flowers, those beauteous natural monitors of our mortality. Man, says Isaiah, " fades as a leaf ;" " his glorious beauty is a fading flower ;" he is " as an oak whose leaf fadeth, and as a garden that hath no water." Job, in one of his most

moving complaints, likens himself to "a leaf driven to and fro." "As for man," says the Psalmist, "his days are as grass; as a flower of the field so he flourisheth; for the wind passeth over it and it is gone; and the place thereof shall know it no more;" Psalm ciii. 15, 16. Such are a few of the simple and pathetic allusions of the Hebrew poets to the flower-like frailty of our race; and theirs is the sublime voice of inspiration. Here, while we acknowledge and apply to our hearts the truth of their images, let us profit by the lesson they give us, and derive from the natural objects around us impressive illustrations of our weakness and our doom.

Were it not for our assurance of immortality, the fall of the leaf would suggest to us mournful thoughts indeed. It would disturb all our enjoyments, and feed our despair. Nature teaches us our feebleness and death; but it is Revelation that, while it directs our attention to such lessons as Nature gives, assures us that we shall rise from the grave to a new life, and thenceforth be immortal. The winds of winter ravage the groves, and a feeling of death arises in the mind; but in the unchangeable word of God, we find what robs this feeling of its sting, and fills us with enlivening hope. There we behold Him who is the Resurrection and the Life, of whose rising from the grave—the pledge of our immortality—this and every returning Sabbath is a solemn memorial. There also we learn, that if we receive Him into our hearts, and obey Him in our lives, we may contemplate death, and all the images that shadow forth his power, without shuddering or dismay. O, then, let Nature, in all her moods and seasons, only direct us to this source of all consolation,—this sovereign remedy for all the pains and diseases of the soul.

J. D.

THIRTEENTH WEEK—MONDAY.

GENERAL SUMMARY OF THE ARGUMENT.—GOVERNMENT OF THE WORLD BY GENERAL LAWS.

THERE is a characteristic feature in the works of creation, on which the infidel has founded one of his most insidious objections, I mean that which exhibits the world as under the direction of general principles, known in common language by the name of laws. It has been alleged that these laws are no other than certain powers inherent in matter, necessarily existing independent of an Intelligent Agent, and acting as mere mechanical or chemical forces, without design, and without a rational object.

This is the atheistic theory in its extreme form, which, if I have not altogether labored in vain, I need not now employ a single word to refute. But another, and more plausible, theory, is sometimes assumed, which it may not be superfluous to notice. According to it, the world, and all its productions, were originally formed by a Being of infinite power and wisdom; but after the act of creation, every thing was left to be regulated by the forces and qualities then impressed upon it, the Creator retiring, as it were, from an active superintendence of his works, and leaving the machine to govern itself by the wisely balanced laws of its own exquisite mechanism. The Eternal and his universe, are thus placed in the relative position of a watchmaker and his watch, with this difference, that when the machine of the universe was once wound up, it was wound up for ever, and, being an instrument of perpetual motion, will never run down.

In proof of this hypothesis, an appeal is made to the uniformity of nature, and the invariable relation of cause and effect. So entirely, it is said, are the powers of nature unintelligent principles, operating precisely and uniformly according to their own peculiar qualities, in all circumstances, and under every modification, that you can calculate, with unerring certainty, their results; and that

these results will blindly follow, even although they should be productive of the most ruinous consequences, by causing disturbance in the elements, or should give rise to monstrosities in the vegetable or animal world ; and hence it is inferred, that whatever power and wisdom have been exerted in the first formation of nature, no such qualities are at present actively employed in its preservation and direction.

Although we admit the fact, we must deny the inference. It is easy to perceive, that the adoption of a rule or mode of operation, not to be deviated from except in extreme cases, is an essential element in any system which Creative Intelligence could employ. It is, indeed, one of the most direct evidences of superlative wisdom. Let any person attempt to conceive a system of Divine government, destitute of a uniform and rigid mode of operation, and founded on expedients and incidental modifications, or even largely admitting them, and he will at once perceive, that such a system, so far from indicating superior wisdom, would only be a proof of defective power, or limited intelligence. That the operations of a being of infinite perfection should be, not only consistent with themselves, but conducted on a uniform and universal system which should admit of no ordinary deviation, is just what might, *à priori*, be confidently anticipated ; and what, as I have elsewhere shown, was absolutely necessary in any plan intended for the direction of rational creatures.*

It is hence obvious, that the mere invariableness with which the operations of nature are conducted, forms no argument in favor of the mechanical theory ; since, whether the Almighty continues to regulate the affairs of his universe or not, this must constitute an essential character of his works. But this is the only foundation on which the theory is reared ; and it, therefore, falls to the ground, along with all the ingenious speculations connected with it.

The truth is, that the skeptics who support this view,

* See Paper in this Volume, 'On the Stability of Nature,' where this argument is discussed.

have strangely bewildered themselves by the use of a mere name. They give the modes which the Creator has adopted in conducting the material world, the deceptive name of "the laws of Nature;" and then they form to themselves some vague notions of an independent power inherent in these laws. Nothing can be more puerile. Paley sets this matter in its true light in a few words. "A law," says he, "presupposes an agent, for it is only the mode according to which an agent proceeds; it implies a power, for it is the order according to which that power acts. Without this agent, without this power, which are both distinct from itself, the *law* does nothing,—is nothing."

Let us apply this definition to the material universe. Gravitation is a law every where in operation. It is possible to conceive, that, by what is called the *inertia* of matter, operating along with this law in the act of creation, the universe might have taken its present form; but assuming this to be the mode by which the self-existent Being gave to all the orbs of nature their original motions, it still required a continuance of the gravitating principle to preserve them in their respective spheres. This principle is not like inertia, the prolongation of a motion once impressed by an external cause; it is, on the contrary, a constant effort to overcome a resisting force, and by that effort it balances and modifies the motion. It is obvious, then, that this force was not merely employed at first, but continues still to be employed. What, then, is it—a law? This is nothing independent of an agent. An inherent and independent principle of motion? To admit this, is to confound the very definitions of matter and spirit,—of that which is acted on, and of that which acts. Shall we, then, suppose some intermediate agent? Be it so. But there must still be a power beyond this, from which that agent derived its properties. The power, therefore, which ultimately produces the gravitations of all the bodies in the universe, can be no other than the power that created them; and, as this power acts every where, and at every instant, the personal government of the Deity must be perpetual and universal.

The very same mode of reasoning will apply to all the great agencies of the universe,—to corpuscular attraction, for example, to chemical action, to heat, to magnetism, to light. Of the latter principle, a recent author, following the same train of argument, beautifully and impressively says, "What causes light to move athwart the whole universe with a velocity that confounds the imagination, eternally traversing those illimitable regions, where myriads of orbs are incessantly circulating under the same guiding power, traversing for ever the abyss of vacancy, —no, not of vacancy, but that incomprehensible vast, where floods of light,—millions of lights,—are ever executing the Deity's commands, ever in motion, and ever performing myriads on myriads of the most incomprehensible motions? Light does not move itself. Who moves it if *He* does not? And when and where, then, are not His interposition, His government, His providence?"*

But it is not merely to the more grand and universal principles of nature that this argument is applicable. It is equally true when employed to show the Divine interference in the more limited operations which have formed the chief subject of our contemplation, as connected with the productions of the vegetable and animal creation, and with the moral government of our globe. Life in all its varied forms, the instincts connected with its preservation and reproduction, the adaptations by which it is fitted to exist on the surface of the earth, in the sea, and in the air, these are all indications, not merely of creating but of preserving and governing power. The history of the human race, in particular, with all the varied machinery by which they are prompted, stimulated, and educated, by which comfort and enjoyment are bestowed, by which discipline is exercised, by which the moral and physical powers, in short, are brought into action and improved, are no less unequivocal evidences that a pervading Providence, at once general and particular, at once vast and minute, full of wisdom, of goodness, and of paternal care, is continually beholding, regulating, and overruling the affairs of men.

* Macculloch on the Attributes of God.

THIRTEENTH WEEK—TUESDAY.

GENERAL SUMMARY OF THE ARGUMENT.—GOVERNMENT OF THE WORLD BY A PARTICULAR PROVIDENCE.

To grant that a God of infinite perfection exists, and called the universe into being, seems to be the conceding of the whole principle, on which our argument for a particular providence rests. The original Creator can, undoubtedly, interfere for the regulation of the worlds He has made. Let it be supposed, that attraction and repulsion, inertia and gravitation, light and life, are all delegated powers, and, in this respect, external to the Creator; they must, notwithstanding, be still subject to his control. The Eternal is omnipresent; why should He not be every where actively employed? It is difficult to conceive of the Divine mind as at any time quiescent; and still more difficult, to comprehend the idea of an independent delegation of his power. Besides, I know not what would be gained by the theory which excludes Him now from his works. He has, by the hypothesis, once interfered; why should He not interfere again? Shall not the God who thought fit to create a world, think fit also to govern it? If He has condescended to call a worm into existence, and provide for its enjoyment and happiness, and that of its species, for countless generations, is it a greater act of condescension to continue to watch over it?

There is, therefore, no reason, *à priori*, for denying the particular providence of God; and the whole frame and constitution of the material and moral world favor the belief. It is impossible, one would think, to reflect on the evidences which, in the course of these volumes, have been adduced in a thousand different forms, of a Superintending Intelligence, ever active, ever beneficent, without acknowledging that the proof is complete. That proof is, indeed, more circumstantial and cumulative than simple and positive; but the circumstances are so numer-

ous, so direct, and so uniformly tending to one point, that nothing but the most perverse and prejudiced intellect can resist it.

And why should we attempt to resist it? To a well-cultivated mind, most assuredly, it must afford a very high delight to be convinced, that all things are under the guidance of a Father-God. How gloomy and dismal would the universe appear, were we to regard it as a mere system of mechanical powers and chemical agents, without a presiding soul to direct them. In regarding the operation of these blind causes, our wonder might be excited, but there would be nothing to esteem, nothing to love; or, if we might still look back to the distant act of creation, the idea would be too vague, too remote, too darkly hid in the mists of interminable ages, to call forth any thing but a cold and feeble admiration.

It is the sense of a present Deity which fills the heart with the deepest and purest emotion. When we trace His hand forming the elegant flower, and painting its blushing petals, or throwing the green carpet over the earth, or rearing the lofty forest, or spreading out the waters of the great deep, and prescribing the bounds which its proud waves cannot pass; when we see Him shining in the sun, and giving glory to his morning, mid-day, and evening rays, or drawing the curtain of night, and pouring around us the softened brightness of ten thousand sparkling worlds; when we hear Him whispering in the breeze, murmuring in the stream, or raising his awful voice in the rolling thunder, it is then that brute nature becomes animated, intelligent, and glorious; the seen is but an indication of the unseen; the inactive, of the active; the lifeless and unintellectual mass, of all that is excellent in power, and wisdom, and goodness.

This sentiment is increased, when we attend to the operations of Providence in the animal creation, and remember that things without feeling, are only made and preserved for the use of those which possess it. We are now introduced to a system, not only full of wonder and beauty, but overflowing with love. The Eternal Parent every where appears, diffusing life and enjoyment. Every blade

of the field, every leaf of the forest, every drop of water in the mighty ocean is instinct with sentient beings; and wherever there is sensation, there is happiness, or a tendency towards it. If from microscopic animals we ascend the scale, and look through the various departments of the living creation, the same principle is there universally operating under interminable modifications. Myriads on myriads of animated beings breathe, and act, and enjoy; and all of them display the tender care of an ever-wise, ever-watchful, ever-bountiful Providence. The various instincts of the tenants of the water, the earth, and the air; their adaptation to their divers and sometimes opposite circumstances; the admirable contrivances by which the external world is suited to their subsistence, their accommodation, the exercise of their bodily organs, and of their faculties of enjoyment,—all these are beheld with peculiar delight, when, in them, we not only recognise an intelligent Creator, but a never-failing, unperplexed, unwearying Preserver, Governor, and Benefactor,—to sum up all in one word, a Parent-God.

But if it be pleasing and edifying to view the lower creation in this light, what shall we say when we turn to Him who is the only image of Divine intelligence, in this sublunary sphere. The same Being who governs the physical, governs also the moral world. He who imparted to the birds of the air, and the beasts of the field, feelings, propensities, desires, and affections, has imparted the same to man, but for a far nobler purpose. He has bestowed on him the principle of reason, to modify, regulate, and guide these faculties; He has gifted him with an immortal soul, to be trained in the school of his providence for the world of spirits. How sublime and ennobling the occupation, to learn his will by investigating his works, and to mark his perfections employed in opening and exercising, in enlarging and strengthening, the mental powers of his intelligent but wayward creature.

"See only," says Lord Brougham, "in what contemplations the wisest of men end their most sublime inquiries. Mark where it is that a Newton finally reposes, after

piercing the thickest veil that envelopes Nature, grasping and arresting in their course the most subtile of her elements, and the swiftest; traversing the regions of boundless space; exploring worlds beyond the solar ray; giving out the law which binds the universe in eternal order. He rests, as by an inevitable necessity, upon the contemplation of the great First Cause, and holds it his highest glory to have made the evidence of his existence, and the dispensations of his power and of his wisdom, better understood by men."* "What delight," adds this eloquent author in another place, "can be more elevating, more truly worthy of a rational creature's enjoyment, than to feel, wherever we tread the paths of scientific inquiry, new evidence springing up around our footsteps,—new traces of Divine intelligence and power meeting our eye! We are never alone; at least, like the old Roman, we are never less alone than in our solitude. We walk with the Deity: we commune with the great First Cause, who sustains every instant what the word of his power made."†

But there is an employment unspeakably more sublime and ennobling still. What we read but darkly in the book of Nature, is traced as with a sunbeam in the book of Revelation. There the Eternal displays his character in all its majesty and beauty,—in all its terrors and in all its grace. How astonishing is the light which the Gospel of Christ throws at once on the Divine perfections, and on the past history and the future fate of man! Let us wonder and adore. Let us tremble and repent. Let us love and obey.

But while it seems impossible, that any rightly-constituted mind can resist the evidence of a present Deity, in all the works of nature; and while revelation pours a light, at once clear, lovely, and glorious, on the Divine perfections, as exhibited in the operations of his providence and grace; neither natural nor revealed religion affords, or can afford, much insight into his essential prop-

* Brougham's 'Discourse on Natural Theology,' p. 194.

† Ibid. p. 196.

erties. That He is an infinite, eternal, and unchangeable spirit, all enlightened philosophy, as well as inspired truth, undoubtedly teaches; but when we attempt to penetrate deeper, all is darkness and mystery. We know nothing of the essence even of created things, and how shall we hope to comprehend the essence of the uncreated?

THIRTEENTH WEEK—WEDNESDAY.

GENERAL SUMMARY OF THE ARGUMENT.—CONTRAST BETWEEN SAVAGE AND CIVILIZED LIFE IN RELATION TO THE ARTS.

The history of the arts, is in truth the history of a particular department in the operations of Divine providence. The progress of society, which we have been considering, is the result of that peculiar discipline which the Creator, by means of the general and particular laws He has impressed on nature, exercises over the human race; and, before bringing these volumes to a close, it seems desirable to revert to the ground we have passed, that we may, at a single glance, take a survey of this wonderful and complicated scheme.

To do this advantageously, we must look at man himself, and trace the progress he has made. We can best accomplish this in the manner already adopted, not by following his actual history, but by contrasting man with man, as we see him existing in various situations, and under different circumstances. We may safely take for granted that the original features of the human mind are essentially the same. If any tribe, therefore, is found to be materially different from another, it must be owing to the peculiar training which each undergoes,—to the impressions which have been made on their minds by culture, and by the pressure of circumstances and events. Take an infant of one of the savage tribes of Australia or North America, and, separating him from his people, edu-

cate him in the arts and sciences of civilized life, and who will venture to say that, when he grows to manhood, he may not rival by his genius a Watt, an Arkwright, or even a Newton? It may be true, indeed, that the peculiar habits of a parent's mind, as well as his mode of living, may affect, to a considerable extent, the mental faculties of his offspring; and it is difficult, if not impossible, to estimate the degree of capacity or incapacity which this may produce. That national character depends, in some measure, on these influences, there is reason to believe; but, whatever may be the differences thus effected, let it be remembered, that these are, in reality, part of the elements which enter into the question we are considering;—that it is not the state of a particular generation of which we speak, but the result of the discipline of centuries; and could it even be proved, that a particular race communicates its own stupidity or intelligence to the mind of its infant offspring, antecedent to all education, this would not essentially alter the case; it would only remove the effect of discipline further back. To whatever distance backwards we suppose the influence to extend, by which character and talent are affected, still, originally, mind is the same; and it is, after all, a peculiar mode of training which merely causes the difference.

This being admitted, let us observe the differences between the savage and the civilized man. Were we to take the extremes of society, we might draw the comparison, between the educated inhabitant of England, and the rude native of New Holland,—a naked, grovelling, brutal savage, without settled habitation, without even the storing instinct belonging to many of the inferior animals; depending from day to day on the precarious produce of the land or sea; sometimes laboring under the pressure of extreme destitution, and continually exhibiting all the selfishness and ferocity which the cravings of hunger sometimes produce on the minds of persons more civilized.

But we need not descend to so degrading and mortifying an exhibition of human nature. If we look at the wild Indian tribes of North America, and compare them

with their neighbors of European extraction, natives of the same country and the same climate, the contrast will be sufficiently striking. For two centuries, they have lived in the immediate vicinity of civilized men ; but they have made scarcely any advancement in civilized life.

They roam their native woods in search of fruits, roots, or wild animals, to satisfy the cravings of hunger ; neither practising the arts of agriculture, nor even, to any extent, the less artificial occupation of the shepherd state. Their wigwams, rudely constructed, serve merely for shelter from the rain and cold, and contain little of what deserves the name either of furniture, or of domestic implements. The men, when not engaged in the necessary toils of the chase, bask indolently in the sun, while they compel their women to bear the whole labor of domestic drudgery. For their clothing, they are indebted to their intercourse with the whites, who exchange cloth for the furs of their native animals ; and if they show any ingenuity in handicraft, it is excited by their desire either for this necessary, or for weapons by which they may secure their prey ; or, still more powerfully perhaps, by their passion for spirituous liquors, with which they render their debased minds more brutal than ever.

Turn now to the more active and enlightened intruders into their original haunts, and what do you behold ? You see, as the fruit of their skill and industry, the trees which encumbered their fertile soil, levelled, to give place to fields teeming with vegetable wealth, and furnishing abundant supplies for the manufacture of food and clothing ; while these very trees themselves, are converted into a thousand ingenious instruments, and means of comfort and transportation ; sometimes affording materials for substantial and commodious habitations ; sometimes fashioned into implements of husbandry ; sometimes forming machinery, which a thousand-fold facilitates the labors of the manufacturer ; and sometimes, in another form, descending into the mighty deep, tracking the restless ocean, and giving rise to a useful and humanizing intercourse between the remotest corners of the earth. Meanwhile, flocks and herds crop the luxuriant herbage, to increase the means

of comfortable subsistence ; horses give their strength to draw the plough and the wain ; roads and canals form means of ready communication ; and, to complete the whole, steam lends its wonderful powers, by which the most mighty and complicated machinery is put in motion, barges ply against wind and stream, and carriages move along the solid earth with the velocity of an eagle ! Observe the results of these means and appliances. Cities, palaces, and temples, rise on every hand. The earth becomes vital with a crowded and industrious population, who are buoyant with hope, and noble with intelligence. The arts and sciences flourish, and hand in hand lead on the human intellect. Invention becomes rife, and genius triumphs. Who can refuse, in all this, to recognise the unseen Hand which carries on "the mighty process for the formation of mind !"*

THIRTEENTH WEEK—THURSDAY.

GENERAL SUMMARY OF THE ARGUMENT.—CONTRAST BETWEEN SAVAGE AND CIVILIZED LIFE RELATIVE TO DOMESTIC COMFORTS AND CONVENIENCES.

If from the improvements made by the progress of the arts, in regard to agricultural produce, and the facilities obtained for manufacturing industry, and commercial intercourse, we turn to the consideration of the domestic condition of man in a state of civilized society, we shall not be less struck with the change which industry and ingenuity have effected. Contrast the habitation of a man in his advanced state, with that of a savage. The one is a wretched hovel, carelessly and unskilfully raised by himself, and the members of his family, as a mere place of shelter from the inclemency of the seasons ; the other is

* [But great is our condemnation, and great should be our shame, that with all our superior attainments and advantages, we have not treated the poor Indians with more justice, forbearance, and humanity.—Am. Ed.]

the result of the combined labors of thousands, artfully contrived, to supply numerous natural and artificial wants, and to contribute largely to convenience and luxury.

In the residence of a country gentleman of moderate fortune, for example, what taste and elegance are displayed even in the exterior appearance of the building, and in the grounds with which it is surrounded. On considering how the work has been produced, we are led to admire, not merely the consummate skill and contrivance, but the wonderful effect of combination. Examine the materials of which it is constructed. The stone has been excavated from the quarry, has been conveyed in carts, has been artfully hewn, has been built by rule of level, line, and square. The lime, which forms the cement, has not only been quarried and conveyed, like the stone, but it has been calcined in the kiln, subdued by water, and tempered with sand. In these various processes, what numerous hands, and what different skill have been employed. I do not merely allude to the quarrymen, the lime-burners, the carters, and the masons ; but to a far more numerous class, by whose skill and industry the tools and instruments, with which they carry on their varied labors, were produced. Think of the iron of which the tools are made, how it was dug out of the bowels of the earth, and smelted, and formed into bars, and sold, and resold, before it was fashioned on the blacksmith's anvil. In every one of these processes, how many combinations of human labor and ingenuity were required ! The coals, for instance, which formed the fire by which the lime was burned, and the iron smelted,—what art and toil must have been called into action, before they were extracted from their native bed, hundreds of fathoms, perhaps, below the surface of the earth ;—the ropes, the buckets, the steam-engine, and the many other instruments employed in that one operation,—what additional employment must these have given to the rope-maker, the cooper, the engineer, the mechanic ! You may go further, and take into account the ingenuity and labor expended on these very instruments,—the materials of which they were formed,—the furnaces in which these materials were extracted from the ore,—the

foundries, the workshops, the warehouses. But we lose ourselves in the multiplicity and complicated nature of such operations.

Yet all this astonishing expenditure of skill and industry was necessary, in the simple erection of the walls of the building. It had yet to be roofed with timber, artfully joined together, and covered with slates or lead; to be floored in its various stories; to be furnished with stairs; to be divided into apartments; to be defended from the external air by doors and windows. In these operations, how numerous, again, are the necessary combinations! It would be tedious to analyze them; but a single glance is sufficient to convince us of their vast extent.

The house is erected and inhabited. Enter one of the rooms, and you shall observe, in that small compass, the work of a thousand artisans and manufacturers. The chairs and tables are formed of wood, which has crossed the seas in ships, themselves the work of hundreds of skilful men. But suppose that foreign wood conveyed to port, it had to undergo numerous processes before it was formed into furniture; the sawyer has cut it, the cabinet-maker has formed and polished it, the upholsterer has prepared the stuffed seats; and how many tools, fashioned by many hands, must have been employed in these operations. If we look at the other articles that replenish the room, its carpet, its mirrors, its pictures, the paper which adorns the walls, the marble which shines in the chimney-piece, the grate with its appurtenances, there seems no end to the combinations of human art and industry, which we discover in the furnishings of this one apartment.

If, pursuing the same method of inquiry, we were to attend to the various articles peculiar to different apartments, the dining-room, the drawing-room, the bed-rooms, the library, the kitchen, what new causes of wonder and admiration would appear, till we should become quite bewildered in the contemplation. The furniture, the beds, the books, the culinary utensils, would each form a separate theme of interesting consideration; and, at every turn, we should be inclined to ask ourselves, do the framers and possessors of these things belong, indeed, to the

same race from which has sprung the naked, abject, and unenlightened barbarian of the woods ?

The effects of combination in the production of the comforts and conveniences of civilized society, appear more surprising the more minutely they are considered. The rich, and convenient, and varied clothing produced from the cocoon of the silkworm, the fleece of the sheep, the fibres of the hemp plant, and the down of the cotton plant; the different kinds of china and earthenware, which, in such elegant and useful variety, adorn our tables ; the viands and seasonings which are selected from every quarter of the globe, to administer to the gratification of our appetite ; the fire which warms, and the lamps and candles which enlighten the family circle, when cold and darkness begin to encroach on the waning year ;—all are the result of accumulated skill in the arts, and of combined industry. Man has learned the value of social intercourse, and the interchange of commodities, by the providential arrangements which have adapted him to the world in which he lives, and the world to him ; his wants have grown and been supplied, while the very supply has increased the demand ; that demand, again, has occasioned the separation of men into distinct trades and professions, in which each has taken his own separate department, as genius, inclination, and opportunity offered. A proficiency, and comparative perfection, has thus been acquired in the arts ; and the whole has resulted in that astonishing and complex system, which we have been contemplating.

By selecting a single dwelling, however, in which all these comforts and conveniences are combined, we form but a very inadequate view of the working of the system. Every person who has labored in the production of any of the articles, employed for the convenience of the single household who reside under that roof, has benefited by the wants of that family, as they have, in their turn, benefited by his labors ; and thus a reciprocal action is produced by the stimulus of mutual advantage ; and, in the gratification of individual desires, the whole community flourishes.

THIRTEENTH WEEK—FRIDAY.

GENERAL SUMMARY OF THE ARGUMENT.—CONTRAST BETWEEN SAVAGE AND CIVILIZED LIFE IN RELATION TO COMMERCE.

THE savage knows scarcely any thing of the principles of modern commerce. His wants are few and easily satisfied ; they differ, indeed, little from those of the brutes. If he finds food and shelter, with a scanty covering to his body, this sums up his whole vocabulary of necessaries and conveniences. Of comfort, he has neither the name nor the idea. Modern travellers have visited various nations who are still in this deplorable condition. They are united in societies for mutual defence ; but they have only very indistinct views of property and of barter. Of these rudiments of commerce, however, they are not entirely ignorant. A man of peculiar prowess in hunting, appropriates to himself, and his immediate dependants, the produce of the chase. If he has killed more wild animals than his family can consume, he exchanges their flesh and skins for the honey and fruits, which his neighbor has gathered in the woods. If he wants better weapons than his own ingenuity can fashion, he parts with some superfluity that he may obtain them, from one of his tribe more skilful in handicraft than himself ; if his ambition extends to a more convenient, or a larger dwelling, he still purchases this gratification by barter.

This is all the commercial intercourse that the barbarian requires ; but the very first steps in civilization render such transactions altogether inconvenient. Suppose a tribe advanced to the shepherd state. A man wishes to obtain possession of his neighbor's sheep or ox, but, if he has no equivalent to give, which his neighbor requires, his wish cannot, without some circuitous and inconvenient transaction, be gratified. His neighbor, again, may be desirous of parting with something of which the other has no need ; and thus, although they have both some super-

fluity which they would gladly exchange, neither of them can deal together, on the principle of simple barter. Commodities, indeed, can seldom, in an improved state of society, be exchanged for commodities, and still more seldom in the small portions, and on the series of occasions in which they are continually wanted. Hence, nations have found the necessity of employing a common medium of exchange, which the whole community may recognise as either of a certain value, or as the sign of a certain value. This is *money*, and the essential properties required in it are, that it shall be of small comparative bulk, to cause it to pass readily from hand to hand; and that it shall be not only divisible into parts of little value, but capable of being put together in large portions, to enable it to answer every demand. This is one of the most important facilities of local traffic.

The circumstances of different nations, have determined their choice of the materials originally used for this purpose. In several places, pieces of a particular kind of wood, shells of a certain species, fruits, or grains of salt, have been, and still are, used as the common signs and prices of goods. Metals, however, were very early perceived to be the most commodious materials in nature for the purposes of commerce. They are found in almost all climates—yet the precious metals scarcely any where in such quantity as to render them cheap; their hardness and solidity preserve them from accidents; they may be divided into many parts, without diminution of their worth; they readily receive a convenient form and a permanent stamp, intimating their value.

The medium of exchange, thus simple in its commencement, has risen to a great and complicated system. Rulers have felt it to be their duty, and their interest, to take it under their immediate management and protection. National mints have every where been erected, national exchequers and banks have been established, and the maintenance of public credit is viewed, in civilized society, as one of the essential principles in the art of government. In short, the monetary system, as it is called, has risen to the dignity of a science; and the

proper circulation of the medium of exchange in all its complex ramifications, is justly regarded as the life of the social state, being held as necessary to the health of the body politic, as the due circulation of the blood through the heart and veins is to the human frame.

Another important element in commercial prosperity is the art of navigation. This art is also but in its infancy in the savage state. The most barbarous tribes, indeed, whose territories are bounded by the sea, know something of the power of sailing. In their frail canoes formed out of hollowed trees, they fish in their rivers, or paddle along their coasts; but how different are their feeble and timid attempts from the navigation of the present day! Look at the proud navies which fearlessly brave the storm and stem the tide. They crown the triumph of man over the raging elements with which he is surrounded. They render the very deep which separated him from his fellows, the means of social and commercial intercourse; and spread round our ample globe the blessings of wealth and civilization.

How ingenious and courageous is civilized man! In his palace of wood, he rides on the crest of the billows, and scorns the tempest. The wind which chafes the sea, and causes the trembling savage to seek the shore, only bears him forward with expanded sails to his destined harbor. Having appropriated the mysterious power of magnetism, he fears not if the frowning sky conceal from his view the landmarks of earth and the beacons of heaven. He steers fearlessly forward on his trackless, starless course, secure in that art which science has bestowed, and that knowledge which experience has taught. In his daring enterprises he compasses the globe, accumulating and scattering the produce of every clime; communicating to, and receiving from every land wealth, instruction, and mental improvement; and binding the whole earth together in a band of brotherhood.

Nor do his labors and his duties stop here. Gifted with light from heaven, he carries it abroad to dark and perishing nations. Although stimulated to exertion by the fleeting things of time, he has yet a higher commis-

sion, as he has been taught to look forward to a nobler destiny. He goes forth as the enlightened apostle of Him who brought life and immortality to light, with the book of God in his hand, and zeal and love glowing in his heart.

THIRTEENTH WEEK—SATURDAY.

GENERAL SUMMARY OF THE ARGUMENT.—CONTRAST BETWEEN SAVAGE AND CIVILIZED LIFE IN MORAL CULTIVATION.

THERE is a vast difference between intellectual and moral cultivation; and what promotes the one does not always promote the other. In the 'Summer' volume I showed, that, during the advancement of society, there is a point, in which, where Revelation does not come in for our guidance, support, and enlargement, man's progress in morals seems to retrograde, as his intellectual faculties expand; and, in proportion as he becomes more acute and ingenious, he becomes more regardless, depraved, and impious, his love of evil increasing with his power of perpetrating it. This subject will now require a somewhat more particular examination.

Scarcely any thing can be imagined more degraded and abject than society in its lowest state. The aboriginal inhabitants of New Holland and New Zealand, for example, seem to be almost utterly depraved, with scarcely one redeeming quality, and exemplify, more, perhaps, than any other portion of the human race, the horrors of the savage state. In advancing to a higher grade, we find the intelligence and the moral faculties of the community almost equally improved. The Africans, the Hindoos, the inhabitants of China, and of Central Asia, seem each to have their moral and social qualities expanded in proportion to their intellectual powers. In both they are distressingly deficient, but in both they have made a considerable advance beyond the shocking degra-

dation of the first-mentioned tribes. In the degree in which they have submitted to the restraints of regular government,—in nearly the same degree have they been found to have advanced at once in intellectual power, and in some of the social virtues.

In speaking of this subject, I purposely avoid taking any examples from Christian society, and must therefore recur to the classical ages of Greece and Rome. These ancient republics were, in their earlier days, remarkable for some heroic and patriotic virtues, which insured their progress. They became great, and powerful, and rich, by the exercise of these virtues. As they advanced in prosperity, new demands were made on their powers of understanding, of invention, and of mental energy, which resulted in undertakings of vast extent, and in imperishable labors of art. But their moral qualities were not equally cultivated. On the contrary, the very exuberance of their mental powers, being exerted on objects which fostered their pride, inflated their vanity, and gave additional intenseness to their selfishness, and while they inflamed their luxurious and dissolute passions, and broke loose from the restraints of moderation and of social duty, gave rise to a character in which the most fearful prostration of morality was accompanied by, and rendered compatible with, high mental attainments. A Cataline and a Nero are specimens of the profligacy of an age, in which the arts and sciences had arrived at a high pitch of improvement.

Another element required to be introduced into the human mind, to enable its moral powers to keep pace with its intellectual attainments,—and this was the element of a pure religion. With regard to this principle, the human mind is naturally in a very peculiar state. There are qualities in our nature which dispose us to entertain sentiments of religion ; but these sentiments are feeble and distorted. The lowest barbarian has some faint sense of a superior power which rules his destinies, and which he must propitiate. The Australian turns his face to the rising and setting sun, and recognises a presiding Deity in the wild howl by which he acknowledges the approach

and departure of that material emblem of the Creator's glory. The American Indian worships the Great Spirit, while

——————"his untutored mind
Sees God in clouds, and hears Him in the wind."

The imaginative inhabitant of the East, as well as the ignorant and abused native of the African continent, has his idol or his fetish, to which he pays a superstitious homage. The follower of Mohammed is the devoted slave of a system of worship, in which the Divine dictates of revealed truth are artfully blended with the grossness of a polluted earthly imagination. All these demonstrate the existence of a deep-rooted sentiment, a peculiar faculty in our nature, which, though perverted by ignorance, and degraded by vice, may yet be made the foundation of the most exalted and ennobling feelings that can expand the human heart.

This is the faculty on which the sublime doctrines of our Christian faith lay hold, to purify and exalt the human character. By the first revelation, to Abraham and to Moses, it was partially enlightened; but it was reserved for the Son of God, Himself, through the medium of this faculty, to bring the mind up to its proper dignity. He addresses every power of the understanding and the heart, our reason, our imagination, our affections; and, through every avenue, He finds access to our religious feelings. He incites us by hope, He alarms us with fear, He persuades us, He draws us by the cords of love; and, by a mysterious and Divine influence, He renews us in the spirit of our minds.

The individuals who are the objects of this discipline are enabled to resist the temptations with which they are surrounded, to rise above the grossness and pollution of the atmosphere in which they dwell, and to shine in the light of heaven. Those very temptations, when overcome, are rendered the means of improving their strength, and enabling them to advance more assiduously on the path of duty and honor; that very grossness and pollution, when they emerge from them, only cause them to rise nearer to the gate of paradise.

Meanwhile the human intellect, under the stimulus of the various causes we have described, rapidly advances; and, while Revelation, with all its motives and influences, is suited to all states of society, the savage and the civilized; to all talents, the simple, the acute, and the wise; to all acquirements, the ignorant and the learned, the rich and the poor, it shines the brightest, and its power extends the furthest, when genius and intelligence are combined with piety. If we look for a character among mere human beings, to concentrate all our admiration, and to engage all our affections, it is such a one as that of Newton, who, to the largest range of intellect, and the highest cultivation of his mental powers, added the humility, the purity, and the devotion of a Christian.

FOURTEENTH WEEK—SUNDAY.

"THE HARVEST IS THE END OF THE WORLD."

THE destruction of any thing that has been constructed at the expense of much pains and ingenuity, is very painful and disappointing to man. The more he has labored after its excellence, and the more it has been useful to him, the more must its termination afflict him. It is very natural, then, for those who admire this great frame of things, and adore creating power and wisdom, to shrink at the prospect of the end of the world. This wonderful exhibition of grandeur and minuteness, of beauty and sublimity, of adaptation and counteraction, is it to come to an end? Are these heavens to be folded up as a scroll, and all these elements to melt with fervent heat? Yes, so it is decreed. So, in the unperturbed tranquillity of his own eternity, hath the Creator appointed. But God's harvest is yet to come. It will not be reaped till the end of the world. When the materials whose occupation, in all the seasons, we have been

studying, shall be changed, and, by the great Creator, adapted to other uses, or employed for the benefit, and under the control, of other beings, they for whom the sun arose and set, and the seasons bloomed and faded, shall be gathered as the final fruit of this earth, and garnered up in the great storehouse, fitted for an eternal and unchanging existence.

We have sown and reaped; we have been enriched with terrestrial abundance, our valleys have smiled in plenty, the little hills have rejoiced on every side; one generation after another has possessed the soil, and enjoyed in autumn the consummation for which they toiled in spring, little weening that these seeds are but the superficial portion, the fleeting produce, while they themselves are the real germs, which must in their turn be deposited in the earth, until the whole world be sown, and these germs be matured.

Then cometh God's harvest. His plan for our earthly sphere has reached its most important era. His purposes with regard to man in his state of trial are accomplished. His well-beloved Son, the Lord of the vineyard, returns in the clouds, with power and great glory, to gather in the fruits. His angels shall collect them from the four winds, from the uttermost part of earth to the uttermost part of heaven. Those whom we have deemed as dead, were but sown, to spring again and be reaped. "All that are in their graves, shall hear his voice." The land, the sea, the cavern, and the wilderness, shall alike spring up instinct with life. O solemn mother earth, on which we tread so carelessly! Is every atom of thy soil engaged in this great concern? Wilt thou, on that day, heave up a breathing mass of human beings? Will generations, divided by thousands of years, meet face to face on thee? Shall we, of these later days, at last look upon Abraham, and Job, and Daniel? Shall we hear the voice of Paul, and Peter, and the beloved disciple? Shall we see come from under the altar, those precious ones, who were slain for the word of God, and for the testimony which they held? shall we admire their spotless robes, and rejoice in their faith-

fulness ? The voice of a great multitude, as the voice of many waters, and as the voice of mighty thunderings, will be in our ears. But the eye of all the seed will be fixed on the Lamb Himself; on Him, whom not having seen, they have loved ; on Him, whom the hope of seeing on that day, has enabled them to rejoice even in this pilgrimage of tears, with joy unspeakable and full of glory.

What need will there be of a glorified body, to enable them to sustain the sight ; what need of a spirit made perfect in holiness to comprehend the beauty ; what need of an undoubting, simple, and true love, to admire the Wonderful, the Redeemer ! How can mortal flesh contemplate such a scene ! Were not the very Judge Himself, the Lamb that has been slain, what flesh would not perish away from the presence of his holiness !

And the Judge ;—when we try to apprehend what his feelings may be at that solemn hour, which shall reap and gather in the souls of uncounted multitudes, we cannot. He is far above, out of our sight. Yet the Scripture reveals to us glimpses of his views. He will then reap that fruit for which He made his soul an offering. His pleasure shall then prosper. He shall see of the travail of his soul, and shall be satisfied. He has borne the sins of many, and made intercession for the transgressors ; and here, at last, assembled before Him, are they for whom He suffered, for whom He interceded, and who are to dwell with Him for ever. Shall He, the holy one, *be satisfied ?* Ah, what manner of persons must we be in all holy conversation and godliness, that He may be satisfied !

The harvestman has toiled through the spring and summer ; when the ingathering arrives he is glad, and when it is completed he hails it with a shout of joy. He is satisfied, because his object is attained ; he hath sown, and he hath reaped and gathered into his barn. So will it be, if we may venture on the analogy, with the Lord. His harvest has come, his angels have reaped, and He is gathering to Himself, all those who love Him and whom He loves. Let us tremble, while we rejoice at the remembrance of his holiness. He must reign till He hath

but all enemies under his feet. He must complete and fit together the glorious building, fixing each living stone in its appointed place, esteeming each precious as it has become a temple of the Holy Ghost; and with this glorious edifice, He *is satisfied*. M. G. L. D.

FOURTEENTH WEEK—MONDAY.

CONCLUSION.

HAVING, in unfolding the Sacred Philosophy of the Seasons, conducted the reader through the various departments of Nature, and directed his attention to the evidences which they every where display of the presence and operations of a Father-God, I feel unwilling to take my leave of him without a few parting words.

We have examined together a most wonderful and very peculiar system, in which there is a continual mingling, or alternation, of light and shade, of beauty and deformity, of good and evil, of pleasure and pain,—a system obviously inconsistent with the absolute perfection of the Eternal, except it be taken in connexion with the Gospel of Him who has brought life and immortality to light. Were it not for a display of the Divine character, and a declaration of the Divine will, so explicit and satisfactory, yet so amazing to the intellect, and so humbling to the pride of man, I know not that the studies in which we have been mutually engaged would be either agreeable or profitable. There would have been much, indeed, to astonish and to interest; but still more to perplex, confound, and baffle the human mind. Philosophers, by the mere light of their science, have in vain attempted to reconcile the appearances of Nature with the existence and moral government of an infinite Creator. They have been able neither to explain the existence of evil; nor yet to agree among themselves as to the foundation of morals; nor to throw any clear and convincing light on the future destiny of the human race.

We have had many ingenious palliations of evil, and beautiful theories of morals, and sublime speculations on the immortality of the soul; but, when the mere Natural Philosopher looks abroad on the face of Creation, and endeavors to verify these views by induction from the appearances around him, he utterly fails. After every concession, and notwithstanding every hypothesis, the naked facts remain incontrovertibly the same. Physical evil, moral evil, universal change, universal decay, universal death,—these are the appalling laws of Nature. Do they indicate the character of Nature's God? The Philosopher of Nature has no satisfactory reply. He may abstract himself from the world of sense, and wrap himself up in the sublime reveries of Plato, or he may seek for the supreme good in the indulgences of Epicurus, but he will find himself, in either case, warring against Nature, and substituting imagination for reality. If he become a disciple of the more rational Bacon, and yet, unlike him, reject revealed truth, he will discover in the Inductive Philosophy only a confirmation of all that is mysterious, inexplicable, and awful in his anticipations. The more minutely and assiduously he questions Nature, the more deeply he will find himself bewildered in an inextricable maze of darkness and of doubt.

But ask the Christian philosopher, Do the appearances of Nature indicate the character of Nature's God? "Yes!" he replies, "but not without the aid of another and clearer index of the Divine Mind, derived from the express declarations of revealed truth." Here is light directly from heaven; which, mingling with the light reflected from the works of creation and providence, displays the character of the Eternal, in all its majesty and beauty. Whatever the Supreme Self-existence may be to other worlds, in the globe which we inhabit He is Governor of fallen and guilty creatures, whom, by the discipline of his Providence, He is training for immortality in a vale of tears, amidst vicissitude, decay, and sorrow. His unseen hand is guiding his wayward offspring through the wilderness. He directs them by his Revealed Word, as He formerly directed his chosen people by a pillar of fire and of cloud.

They must follow at their peril. They may, indeed, turn aside and be lost; but all means, consistent with the liberty of rational beings, are employed to lead them to a land of peace and of happiness. He has sent his own Son to be the Captain of their salvation. He is always ready to shed on their hearts the comforting and sanctifying, the enlightening and exalting influences of his Holy Spirit. If they accept these Divine aids, their affections are raised above the world, while they mingle with its affairs. Their treasure is in heaven, and their hearts are there also. They are not, indeed, exempted from the common lot of humanity; but "all things work together for their good." Disappointment, grief, bereavement, death itself, are but instruments in the hands of a Divine Father, by which the child of Adam is moulded into a child of God; while the enjoyments of life, varied, deep, and intense, are but faint anticipations of a joy which shall never end.

Such is the sublime and unspeakably interesting conclusion, to which all my labors have tended in the work now brought to a termination. To myself the employment has afforded many happy, and, I trust, not unprofitable hours, in the contemplation of the combined wonders of Nature and of grace. To expatiate on the perfections of the God and Father of our Lord Jesus Christ, is indeed the most animating, the most edifying, the most ennobling of all employments; whether we see his hand engaged in carrying on the great scheme of his Providence on earth, or in crowning the whole by the glories of heaven. Reader! may your eyes be opened to trace that hand! may your heart be enlarged and delighted in the contemplation of these perfections! may your soul, purified by Divine love, be prepared for the enjoyment of these glories! And may the writer, directed by the same hand, prepared by the same influences, and washed in the same blood, meet you in heaven!

END OF 'AUTUMN.'

A GLOSSARY

OF THE LATIN, FRENCH, AND OTHER NOT-EASILY-UNDERSTOOD WORDS AND PHRASES.

Acme, the height, or extreme point.
Actinia, the scientific name for the various species of sea-flowers.
Aerated, mixed with air.
Alluvial, relating to alluvium.
Alluvium, earth deposited by recent overflows of water. *Diluvium*, earth deposited by ancient overflows of water.
Alpine, mountainous ; a term derived from the mountains called the Alps, and often applied to other elevated regions.
Annelida, a class of worms.
A priori, in the first instance.
Aorta, the main artery of the body, leading from the heart.
Articulata, the class of articulated or jointed animals.
Arum, a class of plants having dart-shaped leaves, (the name in Hebrew signifying dart,) as the wild turnip.
Asterias, the scientific name of the various species of star-fish.
Axil, or *axilla*, (pl. *axils* or *axillæ*,) the angle between a leaf and the stem, on the upper side.
Blanche, to make white.
Bonspeil, good sport.
Breadwinner, applied, in Scotland, to the head of a family, or the one who provides food for them.
Cambium, a mucilaginous fluid formed from the proper juices of plants, (these being themselves formed from the sap,) and employed directly in vegetable nutrition and growth. It may be considered as analogous to the chyle in animals.
Camera Obscura, literally, a darkened chamber ; the name of an optical instrument, by which the images of external objects, received through a double convex glass, are shown distinctly, and in their proper colors, on the wall of, or on a table in, a darkened room.
Capsule, that kind of hollow seed-vessel, which becomes dry and opens when ripe.
Caribou, an animal of the deer kind.
Carnivora, flesh-eaters.
Caseous, curd-like, cheese-like, having the qualities of cheese.
Caste, (pl. *castes*,) a division made in Hindostan, and other parts of India, between different tribes. No Hindoo will intermarry or eat with any person not of his own caste.
Castor and *Pollux*, twin brothers, who were companions of Jason, in the Argonautic expedition in search of the Golden Fleece. In this

expedition, during a violent storm, two lights, like flames of fire, were seen to play round their heads, and the tempest immediately ceasing, it was superstitiously supposed that they had power to quell storms ; from which circumstance, these ignes fatui, or wild-fires, which are very common in storms at sea, have received the name of Castor and Pollux. From the love of these two brothers for each other, they were said to have been transported to the heavens, and changed into the constellation thence named *Gemini*, or the twins.

Cereal, relating to corn. Cereal plants are the several kinds of grain.

Chelonia, the scientific name of the animals of the tortoise kind.

Chives, the stamens of a plant ; also a sort of small onion.

Chrysalis, (pl. *chrysalids* and *chrysalides*,) the state into which an insect passes from the caterpillar or reptile form, previously to its becoming a butterfly, or moth, &c.

Chyle, a white juice, formed from the chyme, and consisting of the finer and more nutritious parts of the food. It is afterwards converted into blood.

Chyme, the result of the first process which food undergoes in the stomach, previously to its being converted into chyle.

Class, *Order*, *Genus*, *Species*, *Family*, &c. In Natural History, animals, plants, minerals, &c., are arranged in different divisions, for convenience in systematizing them. The objects are first arranged in Classes, each Class is divided into Orders, each Order into Genera, each Genus into Species, and each Species sometimes into Subspecies. The term Family is sometimes used instead of Genus, and objects are often arranged in Families.

Cocoon, the oval ball or case of silk spun by the silkworm, for a covering while it lies in the chrysalis state.

Cointisies, robes.

Coit, a quoit, a thing thrown at a mark.

Congeners, animals belonging to the same natural order.

Confervæ, a tribe of delicate tubular plants, inhabiting fresh water.

Crustacea, the class of animals covered with a crustlike shell, as the crab or lobster.

Crustaceans, the animals of the foregoing class.

Curling, a pastime on the ice, peculiar to some parts of Scotland and Holland. In the former country, it is also called *golf*. The sport consists in striking a ball or stone from one party to another, arranged on opposite sides of a line drawn midway between them ; each party endeavoring to prevent the ball or stone, when struck by the other side, from crossing the line.

Dead-light, an imaginary light superstitiously supposed to be sometimes seen, as a token of the death of some person ; an evil omen.

Denouement, unwinding, explanation, discovery.

Diluvium, see *Alluvium*.

Drift-way, a passage cut in the earth, to connect two shafts of a mine, or under the bed of a river from side to side.

Drupe, a pulpy fruit containing a stone or nut, like the peach.

Eglantine, the sweetbrier rose.

Elf, a wandering spirit, a fairy, an evil spirit.

Elf-Candle, a light supposed to be held by an elf or fairy, and betokening misfortune to the person who saw it ; a bad omen.
Embouchure, the mouth of a river.
Eocene, dawning, the earliest division of the tertiary formation of geologists.
Ephemeron, (pl. *Ephemera*,) an insect of a day.
Et, and.
Exuvia, (pl. *exuviæ*,) cast-off skin, or other covering.
Family, see *Class*.
Fecula, starch.
Feræ, the third order of mammalia, according to Linnæus, including animals of the cat kind.
Filiform, thread-like, slender.
Frond, the leaf of plants, of the class which includes the Fern species.
Genus, (pl. *Genera*,) see *Class*.
Glires, gnawing animals, the fourth order of mammalia, according to Linnæus.
Gramina, grasses.
Gypsum, sulphate of lime, or plaster of Paris.
Helix, (pl. *Helices*,) the Snail family.
Herbivora, grass-eaters.
Hucho, a species of salmon.
Huso, a species of sturgeon.
Ichthyophagites, fish-eaters.
Ignes fatui, plural of ignis fatuus, or wild-fire.
Imago, the perfect state of insects.
Inertia, inertness.
Insomnium, restless sleep.
Involucre, a covering ; a kind of general calyx, (or flower-cup,) serving for many flowers, and usually situated at the base of an umbel, or place where the flower-stalks diverge from one centre like the sticks of an umbrella.
Involute, rolled inwards.
Isochronous, performed in equal times, or in the same space of time.
Larva, (pl. *larvæ*,) the worm-state, or first form of insects after they leave the egg.
Leaflet, a partial leaf, a constituent of a compound leaf.
Leguminous, pod-bearing. Leguminous plants are those whose seeds are enclosed in pods, as peas, beans, tamarinds, &c.
Lepidoptera, the butterfly tribes.
Lichen, a species of moss.
Lignin, one of the constituents of wood, woody fibre.
Luminiferous, bearing, or giving, light.
Manse, the Scotch name for a parsonage-house.
Mausoleum, (pl. *mausolea*,) a tomb, so called from a stately sepulchre erected by Artemisia, Queen of Caria, for her husband Mausolus ; now applied to any elegant sepulchral monument.
Maximum, highest point.
Medine, a small Turkish coin.
Minimum, lowest point.

Miocene, less recent, the division of the tertiary formation, between the *Eocene* and *Pliocene* divisions.

Nebula, (pl. *nebulæ*,) a mist, or little cloud; applied by astronomers to luminous spots in the heavens, of a misty appearance, like that which the milky way presents to the naked eye.

Order, see *Class*.

Operculum, a lid, or little door.

Papilla, (pl. *papillæ*,) the orifice whence the spider secretes the substance of which its web is composed.

Passim, here and there, in various places.

Phenomenon, (pl. *phenomena*,) a natural appearance, generally of an extraordinary kind.

Pirn, in weaving, the quill of the shuttle.

Planaria, a tribe of flat-shaped aquatic worms.

Plies, folds or plaits.

Pliocene, the third or latest division of the tertiary formation of geologists.

Primates, the first order of mammalia, according to Linnæus, including man.

Protégé, (pl. *protégés*,) one who is protected by another.

Pupa, (pl. *pupæ*,) the same as Chrysalis, *which see*.

Redargued, refuted.

Residual, remaining after a part is taken.

Sanctum Sanctorum, the Holy of Holies, or most holy place, often applied to the most important or holiest place in temples, churches, &c.

Shrievedom, the territory within the jurisdiction of a sheriff.

Sisyphus, a person who is fabled to have been condemned to roll to the top of a hill, a large stone, which, just as it had reached the summit, rolled back to the foot of the hill, thus rendering his punishment perpetual.

Somnambulism, sleep-walking.

Spadix, (pl. *spadices*,) an elongated receptacle of flowers.

Species, see *Class*.

Spell, a turn of work, applied also to games in which different persons take their turns or spells.

Stamen, in *weaving*, the warp, the thread, any thing made of threads. In *botany*, that part of a flower, on which the artificial classification is founded, consisting of the filament or stalk, and the anther, which contains the pollen, or fructifying powder.

Stimulus, (pl. *stimuli*,) a strong motive or excitement.

Tentacula, feelers.

Testacea, shell-fish.

Tree-hopper, a tree-toad.

Tryst, appointment, rendezvous.

Ultra-zodiacal, without or beyond the zodiac.

Usufructuaries, those who have the use or enjoyment of property for a time, without having the title or property.

Vertebrata, the class of vertebrated animals.

Viaticum, provision made for a journey.

Vice versa, things being reversed, or the terms being changed.

Vis inertiæ, the power of rest, or inertness.
Warp, in weaving, the threads running lengthwise.
Wear, *weir*, or *wier*, a dam to raise the water in a river.
Weft, or *woof*, in weaving, the threads crossing the warp.
Zoophyte, a minute marine animal, which forms the corals and madrepores. These corals are the dwellings of the animals, which received the name Zoophytes, (from two Greek words, signifying animal and plant,) from the erroneous notion which formerly prevailed, that they partook of the nature of animals and plants.

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